We hope that the information will be of help to you. It is based on concrete data and on the best of our current knowledge.
Read the contents of the manual carefully, including the warnings and recommendations.

Hoyer Frigus 400

Tetra Pak Hoyer S.p.A.
Via Monferrato, 54
20098 San Giuliano Milanese (Milano)
Italy
Telephone +39 2 98292.1
Telefax +39 2 9880171

F40	03	-B	00

HOYER FRIGUS 400

1 - MACHINE IDENTIFICATION DATA

Contents

1.1 Introduction

Thank you for having chosen a Tetra Pak Hoyer machine.
We recommend that you read this manual carefully as it contains essential information regarding the installation, checking and maintenance operations required to keep your macine in perfect condition.

The manual contains tables, drawings and diagrams which will allow you to familiarise yourself with all parts of the machine.
Please let us know if any information is missing or is not sufficiently detailed. Your comments will be used to improve this manual.

1.2 Identification plate

For maintenance and service operations not described in this manual or for any other problem of a technical nature, our Service Department is at your complete disposal for information or to arrange for the necessary measures to be taken.
When contacting our Service Department, please quote the data given on the identification plate affixed to the machine and shown in Fig.1.1.

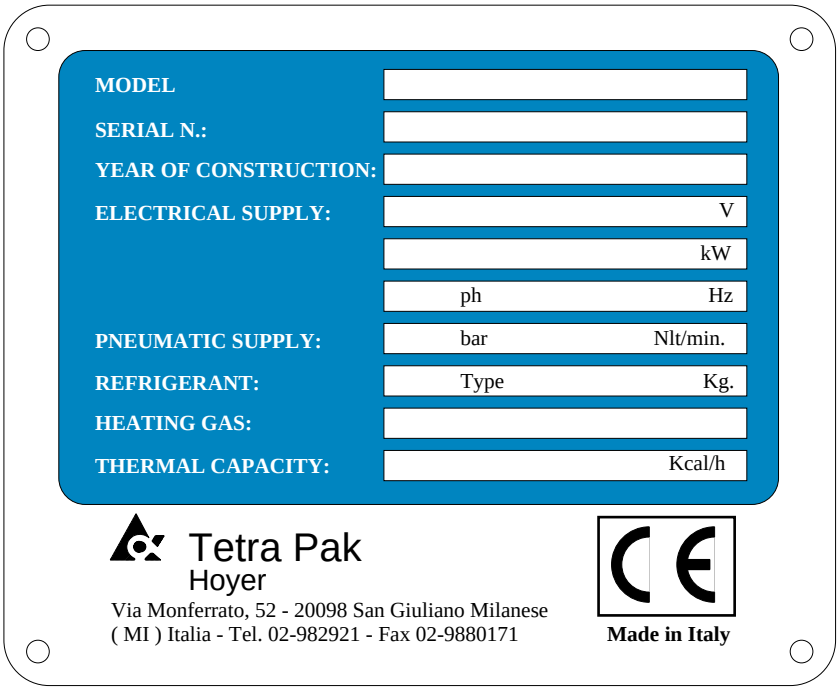


Fig. 1.1 - Identification plate

1.3 Service centres

If you have requirement or problem that requires our assistance, please contact one of the following service centres, which are authorised to perform maintenance and provide technical service for Tetra Pak Hoyer machines.

EUMEA:

Tetra Pak Hoyer ApS
Soeren Nymarks Vej 13
DK-8270 Hoejbjerg
Denmark
Phone: +45 89 39 39 39
Fax: +45 86 29 22 00
Tlx: 6 87 70 alhoy dk

Tetra Pak Hoyer S.p.A.
Via Monferrato, 54
I - 20098 San Giuliano Milanese (Milan)
Italy
Phone: + 39 2 98 29 21
Fax: + 39 2 98 80 171

Tetra Pak Hoyer France
c/o Tetra Laval Service SARL
R.C.S. Versailles B403 276 223
P.O. Box 56
F-78340 Les Clayes-Sous-Bois
France
Phone: +33 1 30818184
Fax: +33 1 30818120

NORTH AMERICA:

Tetra Pak Hoyer Inc.
7711 95th Street
P.O. Box 0902
Pleasant Prairie, WI 53158-0902
USA
Phone: +1 414 947 9100
Fax: +1 414 947 9190

SOUTH AMERICA:

Tetra Pak Hoyer Industria e Comércio Ltda.
Rua Napoleao de Barros, 1038
Cep04024-003 Sao Paulo-SP
Brazil
Phone: +55 11 573 9422
Fax: +55 11 549 5420

ASIA/PACIFIC:

Tetra Pak Hoyer Shanghai
Shanghai Overseas Chinese Mansion
Room 2105-2107
No. 129, Yan'an Xi Lu
200040 Shanghai
P.R. China
Phone: +86 21 6249 0860
Fax: +86 21 6249 9064

Tetra Pak Hoyer Service
3rd Floor, Molace Building
2231 Pasong Tamo Street
Makati, Metro Manila
Philippines
Phone: +63 2 8132848
Fax: +63 2 8132866

SOUTH KOREA:

Hoyer Ltd.
4fl. Dookyong Bldg.
66-1/9 Hannam-Dong
Yong San-Ku
140-210 Seoul
South Korea
Phone: +82 2 796 0362
Fax: +82 2 796 0365

THAILAND:

Tetra Pak Hoyer (Thai) Ltd.
1042 Soi Poosin, Sukhumvit Soi 66/1
Bangchak, Prakanong
Thailand
Phone: +66 2 3611680
Fax: +66 2 3612310

C.I.S.:

Tetra Pak Hoyer A/O
4th Rostovsky peureulok
Dom 1, stroenie 1
R-11921 Moscow
C.I.S.
Phone: +7 502 2242160
Fax: +7 502 2242162

HOYER FRIGUS 400

2 - GENERAL INFORMATION

Contents

2.1 Declaration of conformity

This machine has been manufactured in accordance with international standards and hygiene and sanitary legislation applicable to food machinery.
In particular Tetra Pak Hoyer certifies, through the Declaration of Conformity supplied with the machine, that the **HOYER FRIGUS 400** machine is designed and manufactured in accordance with the provisions of Directive 89/392/CE (Machinery Directive) and with the above-mentioned standards.

2.2 Preliminary observations

- The illustrations and drawings of the machine are intended for general reference only and are not necessarily accurate in every detail;
- The machine dimensions and specifications given in this manual are not binding and may be changed without prior notice;
- The drawings and all other documents provided as a part this machine remain the property of Tetra Pak Hoyer and must not be passed on to third parties without the written permission of Tetra Pak Hoyer.
- The manual includes instructions for all accessories mounted on the standard machine.
- **The machine is covered by warranty as laid down in the purchase contract. Any repair work not authorised by Tetra Pak Hoyer carried out during the warranty period will automatically invalidate the warranty.**

2.3 General safety rules

- THESE SAFETY RULES HAVE BEEN DRAWN UP IN YOUR INTEREST. Strict observance will reduce the risk of accident to yourself ot to others.
- DO NOT attempt to move, install or operate the machine before reading and assimilating the contents of this manual. Ask your superior in case of doubt;
- make sure that all guards and safety covers are in place BEFORE starting the machine;
- NEVER leave tools, mechanical parts or other foreign materials on or inside the machine;
- in the event of a malfunction, press the emergency stop button.
- NEVER PUT YOUR HANDS INSIDE THE MACHINE WHEN IT IS IN OPERATION;
- exercise caution even when the main switch located on the tunnel is in the “OFF” position, as the supply conductors will still be live;
- shut off the compressed air supply before disconnecting any pneumatic component;
- make sure that all guards and safety covers are correctly in place BEFORE restarting the production cycle subsequent to maintenance or repair operations;
- proceed with caution at all times. Remember that you are responsible for your own safety and for that of your colleagues;
- make sure that applicable regulations are observed when moving or lifting the machine.

2.4 Special warnings

- All personnel operating the machine must be familiar with the general safety rules and must observe them strictly. Failure to follow these rules may result in personal injury ordamage to machine components;
- maintenance work must be performed with the machine turned off. The main switch must be in the "OFF" position, the air valve closed and a " work in progress" sign affixed to the machine;
- the user must make sure that all the instructions given in the manual are scrupulously observed;
- users will be solely responsible for risks caused by tampering with the safety system;
- The safety of machines used in conjunction with this machine, if not supplied directly by tetra Pak Hoyer, is the responsibility of the customer.
- The pressure, speed, temperature and voltage limits and all instructions given are indispensable for correct operation of the machine and must always be complied with by the customer.
- Ambient conditions must be taken into consideration during installation.
- National legislation governing this type of machine be observed.

2.5 Residual Risks

The Frigus 400 maker is used for combining ice-cream mixture with sanitary air in fixed quantities and, subsequently, for forming the ice-cream with the addition of cold generated by a refrigeration cycle.
The mixture of ice-cream and sanitary air is blended inside a manifold by means of the pressure of a rotating pump and the injection of compressed air which is then pushed to the cylindrical evaporator of a refrigerating system for the treatment of ice-cream.
Several issues arise when adapting the pre-printer to suit the needs of man: more precisely, centralizing the controls on a single instrument panel for the functions of adjustment and control.
All the transmission parts, the kinematic motions and the refrigerating system are protected by fixed boards.
A signal of danger is placed on the flap of the electric box to indicate live equipment.
For additional safety, the remaining risk is recalled in paragraph **3.5 Instructions on ban and danger signals.**

2.6 Ambient operating limits

The machine is suitable for operation in the following ambient conditions:

- Temperaturae : from 4°C to 40°C
- Humidity : from 20% to 95%.

☞ **NOTE**:

Tetra Pak Hoyer will accept no responsibility for damage or injury caused by failure to comply with the above warnings.

HOYER FRIGUS 400

3 - DESCRIPTION OF THE MACHINE AND TECHNICAL DATA

Contents

3.1 Description of the machine

The FRIGUS 6000 mixes sanitised air into ice cream mix to obtain the desired overrun, cools mix with air incorporated in it to create the viscous product known as ice cream, and supplies sufficient pressure to convey the ice cream to its destination through a pipe.

In order to carry out these functions the machine incorporates the following components:

- a set of filters which sanitise air coming from the compressed air supply;
- a pump which receives mix from ageing vats, adds sanitised air, and sends the product to the freezing cylinder;
- freezing cylinder with a dasher and blades, inside which air is uniformly blended into the mix and the product is cooled until it takes on a thick consistency;
- a refrigerating plant connected to the outside wall of the freezing cylinder to cool it down;
- an electrical system for command and control of all machine functions.

All these items of equipment are assembled on a strong, compact stainless steel frame.

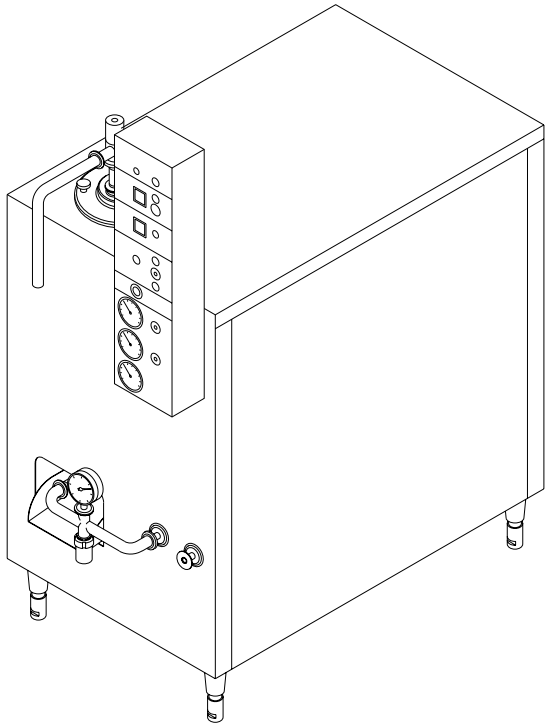


Fig. 3.1

3.1.1 Filter set

The compressed air supply (the machine does not include an air compressor) travels through a pressure reducer (1) and a mesh filter (2) which separates out any large particles; it then goes through a micro-filter for removal of oil vapours (3) and an active carbon filter (4) which eliminates odours. Finally, the clean air goes through a sterilisable Teflon membrane filter (5) with microscopic pores specifically intended to stop the passage of bacteria.
The sanitised air thus obtained is let into the mix between the first and second stage of the mix pump, under a pressure which may be controlled by the operator with a command on the control panel; pressure may be adjusted to increase ice cream volume.

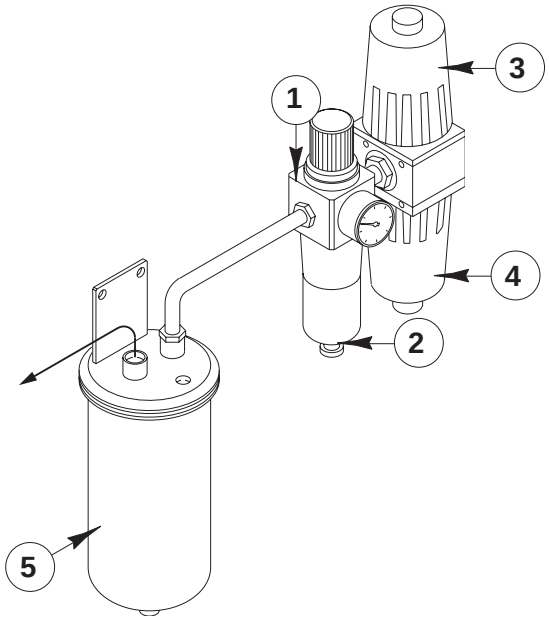


Fig. 3.2

3.1.2 Mix pump

This is a two stage pump constructed with two pistons of different sizes. The first stage (1) receives and meters the quantity of mix set by the operator in accordance with the hourly production required; the second stage (2) receives mix dispensed by the first with sanitised air let in between the two stages and sends it all to the freezing cylinder.
As the difference in volume between the first and the second stage (determined by piston size) does not change depending on cylinder pressure and pump speed, the quantity of air let in per unit of mix is constant and depends on air pressure. By adjusting the pressure of sanitised air , the operator therefore controls the increase in volume, which remains constant throughout the production cycle.

The pump is driven by an electric motor commanded by an inverter (for speed changes) and incorporates a pneumatically driven bypass(3) for CIP washing. It works properly at relatively high pressures, so that no extraction pump is needed coming off the machine.

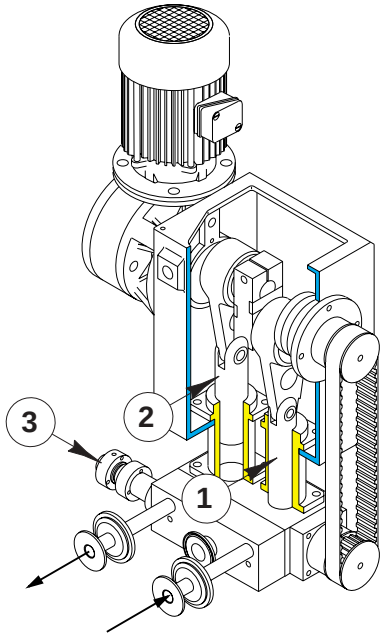


Fig. 3.3

3.1.3 Freezing cylinder

This is the most important part of the machine: an upright pipe with a chrome coating on its inside walls, surrounded by a jacket in which coolant gas flows to cool down the cylinder. A dasher (1) with three blades rotates inside it, scraping the chrome-plated inside surface to ensure that frozen ice cream does not build up on the walls. The top (2) and bottom (3) ends of the cylinder are closed by two covers, which incorporate the mix feed pipe (bottom) (3) and the ice cream exit valve (top) (4).
Mix blended with sanitary air coming from the pump flows into the bottom part of the cylinder (3) ; on its way to the top it is whisked by the dasher (1) and cooled by contact with the walls of the cylinder, kept cold by the refrigerating plant. The ice cream forms and then flows out of the ice cream outlet valve (4) , which is controlled pneumatically to regulate the pressure of ice cream in the cylinder.
In order to make sure the machine operates correctly, it is important to be very careful not to damage the cylinder, always making sure that the scraper blades are in perfect condition and have been assembled correctly.

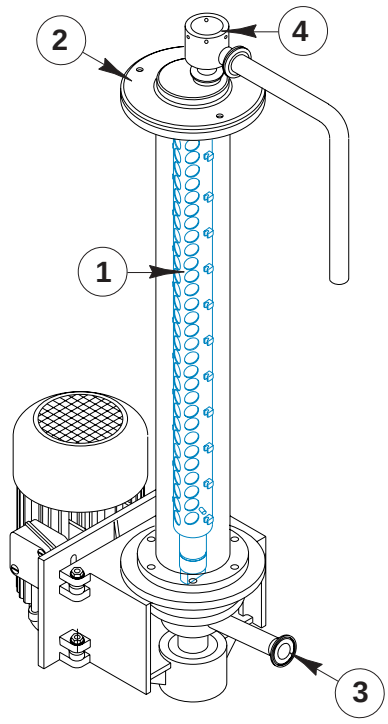


Fig. 3.4

3.1.4 Refrigerating plant

Composed of the freezing cylinder (evaporator), a Copeland Scroll Compliant rotary compressor, a high efficiency condenser, an economiser, a thermostat valve and a number of minor accessories. All these components are designed specifically for operation at low temperatures using R22 or R404A coolant gases.
Cooling is carried out by steam compression: the compressor pumps gas into the condenser, where it is cooled and liquefied, and the liquid gas then passes through the thermostat valve and is vaporised in the freezer cylinder (transforming into gaseous state once more) before returning to the compressor and starting the cycle again. Vaporisation of gas in the freezing cylinder removes heat from the ice cream mix, which cools down; the heat is then disposed of in the condenser, where it is transferred to the water in the tower (or well), heating it.
A pressure switch valve assembled on the condenser water circuit keeps condensation pressure constant, independently of water temperature.
The system mounted on the Frigus 600 is a particularly efficient one which makes use of a dependable, low maintenance Scroll Copeland compressor which acts as a two-stage compressor with an economiser to obtain considerable cooling capacity and improved dependability.

3.1.5 Electrical system

The electrical system consists of the operator panel and the electrical panel which covers all of the rear of the machine. The operator panel may be used to activate or deactivate all machine functions, adjust functions and indicate anomalies. The electrical box at the rear contains the main switch and all control and power devices.

3.1.6 Control panel

1 White power indicator lamp (L1)

2 Red thermal switch indicator light (L2)

3 Pump start/stop switch (SL1)

4 Litre counter (D1)

5 Pump potentiometer (P1)

6 Dash motor ammeter (D2)

7 Dasher start/stop selector (SL2)

8 Compressor start/stop switch (SL3)

9 Overrun air ON/OFF switch (SL4)

10 Hot gas control potentiometer (P2)

11 C.I.P. washing switch (SL5)

12 Emergency stop pushbutton

13 Overrun pressure gauge (M1)

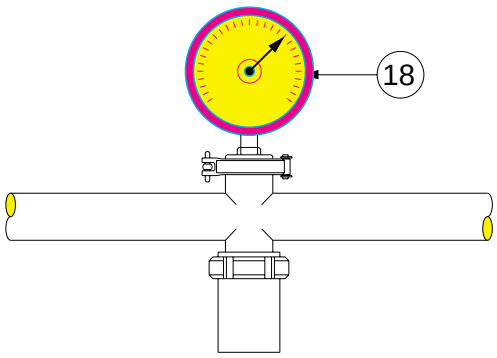
14 Overrun pressure regulator (P3)

15 Cylinder outlet valve pressure indicator (M2)

16 Cylinder outlet valve pressure control (P3)

17 Coolant evaporation pressure gauge

18 Gauge for detection of ice cream pressure in cylinder



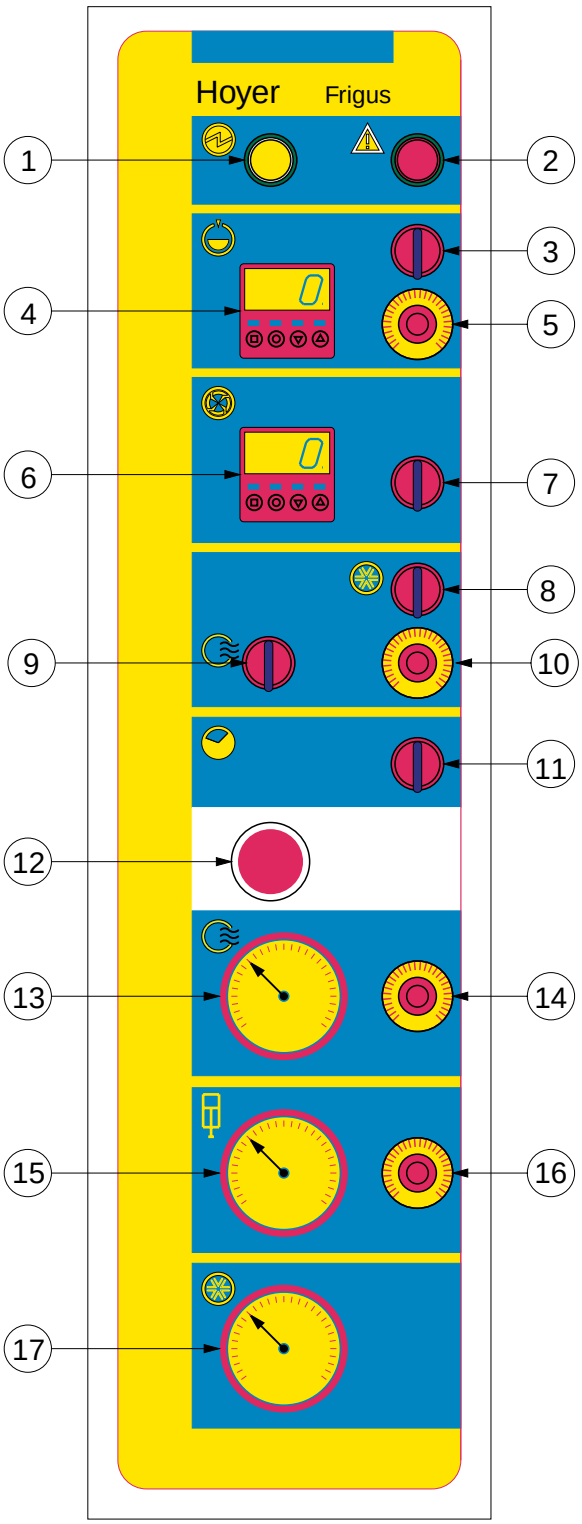


Fig. 3.5

3.2 Technical data

Dimensions and weights:

Dimensions A = 1330
mm

B = 755
mm

C = 1665 ± 25
mm

Net weight: 525
Kg

Gross weight: 725 Kg

Volume (with packaging): 2.96 m³
(1.6 x 0.95 x 1.95 h metres)

Rated capacity:
from 100 to 400 litres/hour of ice cream at –5.5ºC

Standard conditions:

Mix input temperature: + 4°C
Overrun:
100%
Neutral mix with 38% solids content

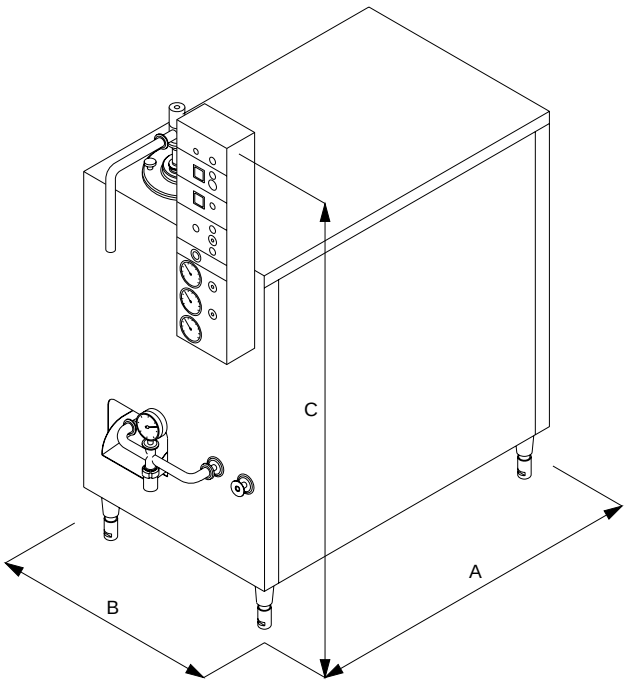


Fig. 3.6

Nominal capacity in standard conditions:
200 to 600 l/h ice cream at –5.5ºC

Electrical specifications:

Dasher motor :	4	kW
Pump motor:	0.75	kW
Refrigerator compressor:	6	kW
Auxiliaries:	0.85	kW
Total installed power:	11.6	kW

Compressed air:

Operating pressure:	6÷10	bar
Consumption (max.):	10	Nl/min
Filtering degree	A0	
Connector:		1 / 2 ”
female		

Refrigerating plant:

Coolant gas:	R404A
Quantity:	2.8 Kg

Condensation water:

a) dwell water @ + 5°C	600 l/h
b) mains water @ +15°C	1100 l/h
c) tower water @ +28°C	3300 l/h

Water inlet connector: 1” gas female
Water outlet connector: 1” gas female

Noise:

A-weighted equivalent sound pressure level at 1 metre:

Leq(A) = 69.9 dB(A)

Max. C-weighted instantaneous sound pressure level at working positions:

Less than 130 dB/20uPa

Max. non-weighted sound pressure level at working positions:

Less than 140 dB/20uPa

Electromagnetic compatibility:

Conforms to VDE 0843/IEC801; wiring in accordance with EN55011

3.3 Improper use

Though the machine is equipped with a number of safety systems, operators must be very careful to make sure that no situations arise which could potentionally put them or others in danger.

The machine is designed and built exclusively for the use described in chapter 3.1. Any other use must be considered improper and unreasonable. The manufacturer shall not be held responsible for any damage caused by improper, erroneous or unreasonable use.

Everyone who works on the machine must be adequately trained in the correct working methods and informed of the nature and functioning of safety devices.

3.4 Demolition and disposal

Information of use for disposal of the machine and its components.

The machine must be demolished by specialised personnel wearing appropriate safety garments and working in compliance with safety and environmental legilation.

Construction materials:
- steel, stainless steel, aluminium, cast iron
- copper, silver in electrical components
- rUbber, nylon, PVC, resins and fibres.

No component is toxic or harmful.
Dispose of reducting gears carefully as they are full of oil.
Do not abandon these components or dispose of them with regular waste.

WARNING! When finished using machines and components, dispose of them in accordance with the laws in effect in your country .

3.5 Warnings, prohibition and danger signs

WARNING:

The doors of the electric board can be opened using the tools supplied with the machine.
The opening of the doors disconnects the components downstream from the main swutch.
Some components may continue to be powered by residual current for a specific interval of time.
After opening the machine, avoid touching the internal parts for at least 5 minutes.
A sign indicating the presence of **powered parts** is placed on the door.

HOYER FRIGUS 400

4 - INSTALLATION

Contents

4.1 Unpacking, delivery checks and transport

The machine is packed in wooden crates. Unpacking must be done close to the installation position. The cases may be easily transported by a lift truck.

If the crate has been damaged during transport, notify the insurance company immediately and do not proceed with removal of packaging until authorised by the insurance company.

When the crate is positioned in the place of installation, proceed to remove the machine from its packaging as follows:

a. Unnail the top cover and remove it. Do the same with the side panels. Take care with the wooden spacers between the walls of the crate.

b. Remove the box containing spare parts and the other components from the crate.

c. Unnail the wooden blocks that hold the machine in place during transport and remove the protective cellophane.

d. Check that the content of the package corresponds to the shipping documents.

e. Make sure that all covers and panels are correctly fastened in place and there are no loose parts.

f. Visually inspect all electrical components to make sure they are in perfect condition.

g. If any part or component is missing, notify Tetra Pak Hoyer immediately.

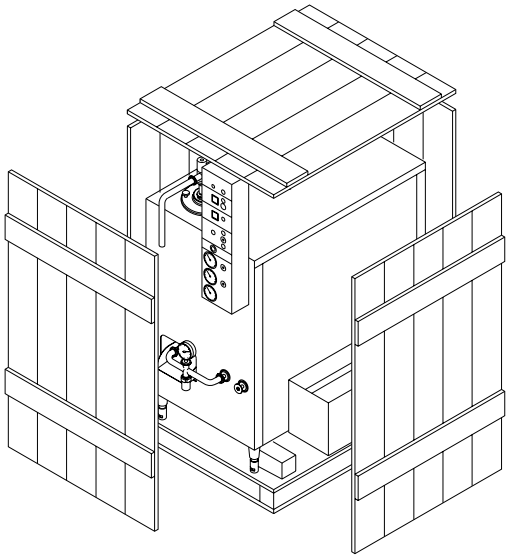


Fig. 4.1

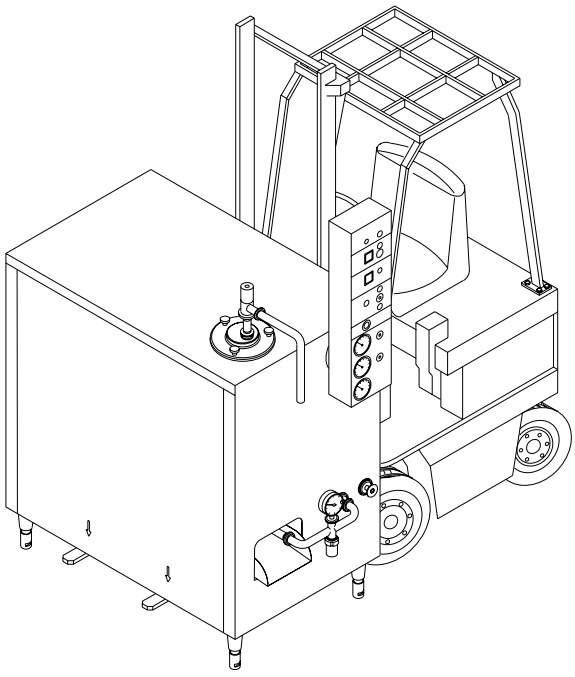


Fig. 4.2

The machine may be moved using a fork lift truck, taking care to position the forks so that the machine's weight is evenly distributed.

4.2 Installation

The machine is fully tested and regulated in the factory with about one hour of ice cream production prior to shipment to the customer. Installation simply involves connecting up the pipes for the condenser cooling water supply, ice cream mix intake and outlet, compressed air supply and electric power supply. There is no need for internal adjustments to the machine; we recommend that factory settings not be changed. Proceed with the installation procedure as follows:

a. Position the machine in its operating position and check the plate data to make sure that the machine is compatible with the site's electrical power supply.

b. Level the machine with a spirit level by means of the adjustable feet. The plates provided may be applied underneath the feet.

c. Connect up the condenser cooling water pipes. (1) (2).

d. Connect up the ice cream mix intake (3) and outlet (4_ pipes to the production line.

e. Connect up the compressed air pipe (5).

f. Connect the machine to the earth and to the electrical power supply (6).

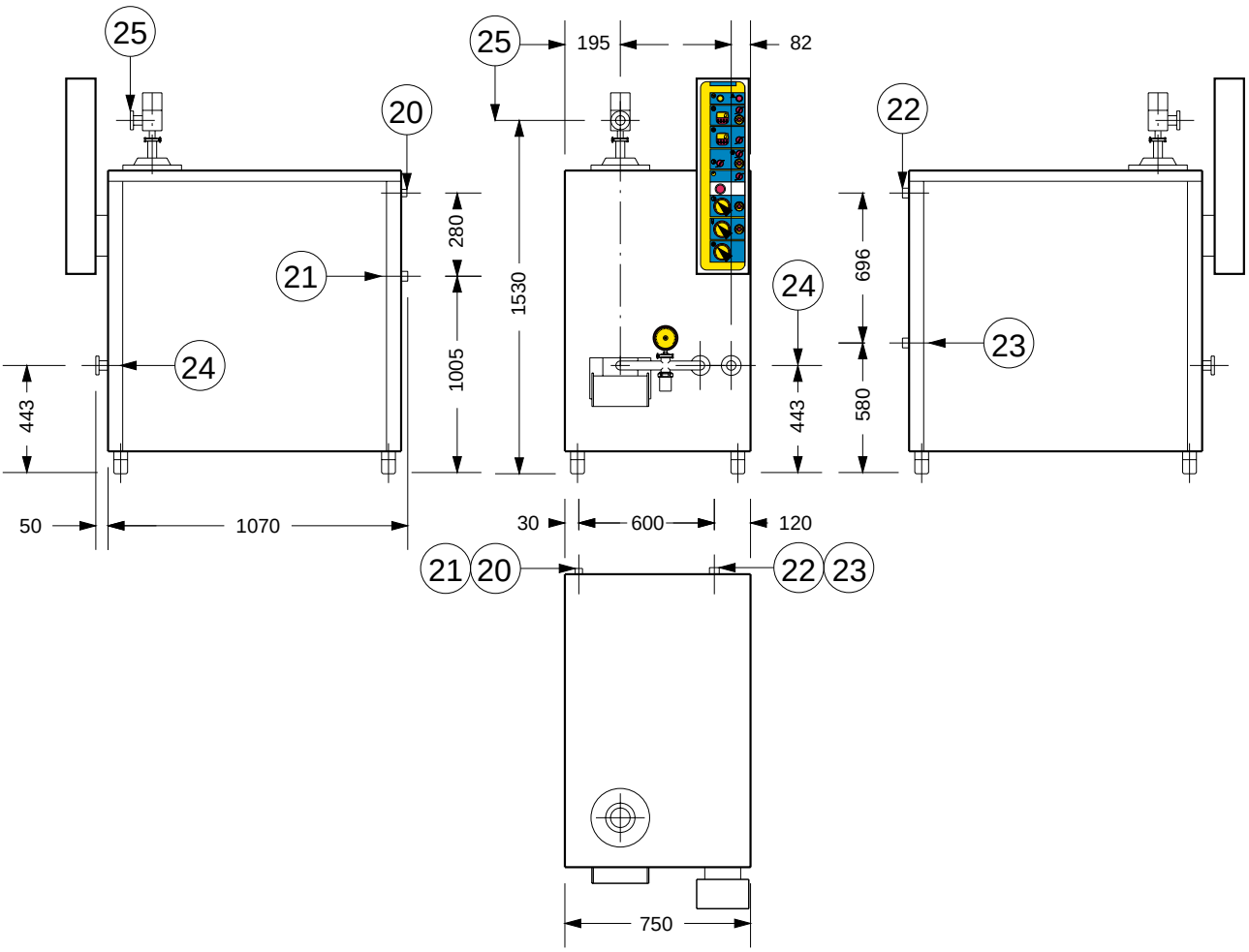


Fig. 4.3

4.2.1 Cooling water connection

Connect up the supply of condenser cooling water, taking care to get the direction of water flow correct: water must flow in through the connection at the bottom (2) and out through the connection at the top (1) . It is recommended that two on/off taps (3) (4) be installed close to the machine, as well as a small drain tap (5) close to the bottom connection; it is also a good idea to connect up these two taps with the machine through two pipe unions (three-piece connectors) to make it easy to separate the freezer from the installation.
The machine is fitted with a pressure valve which controls the flow of water in inverse proportion to its temperature to obtain constant cooling (constant condensation pressure on the coolant side); this makes it possible to use water supplies with widely varying temperatures for cooling the condenser. The water flow varies as a result, from about 600 litres/hour at 5ºC to 3600 litres/hour at 28ºC (average values for machine in operation at maximum production rate).
Pipe diameter depends on pipe length and the pumps available, and must never be less than the diameter of the connections, which is 1" gas. It is essential to wash out the pipes BEFORE connecting them to the machine by flushing them with water to eliminate any particles or dirt. If the water that flows out of the pipes continues to be dirty, it will be necessary to install a filter with a filtering capacity and size appropriate to the type and amount of dirt conveyed at the intake (1) (the bottom connection).

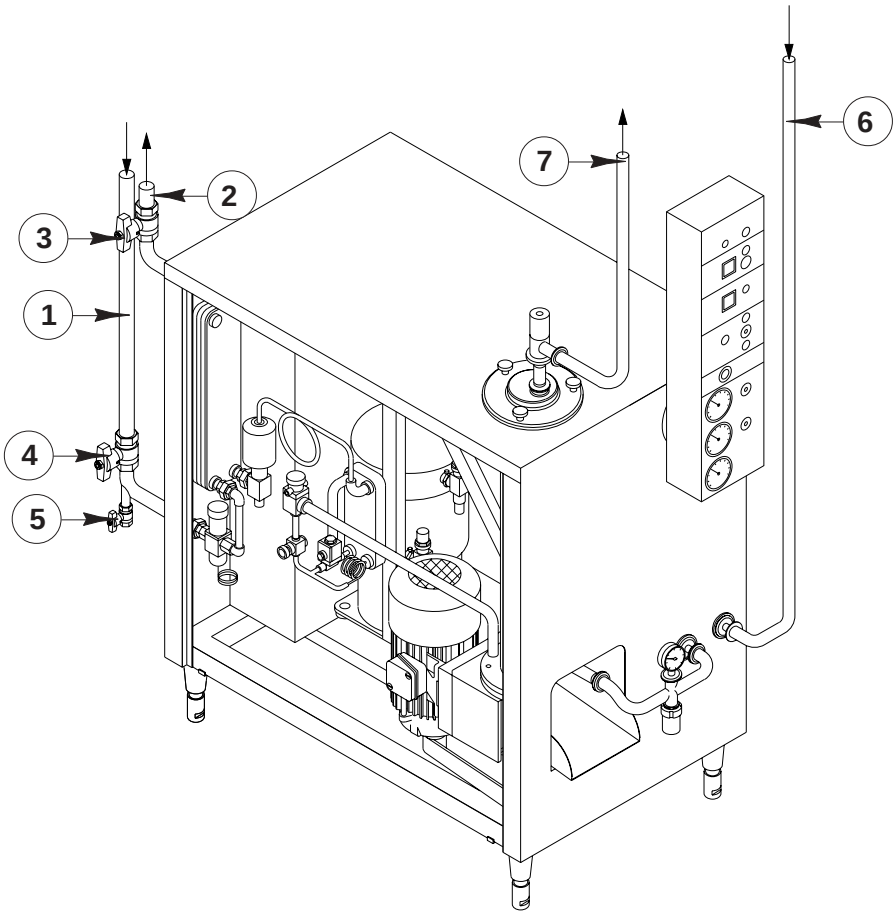


Fig. 4.4

4.2.2 Ice cream intake and outlet connection

Connect the mix supply pipe to the mix pump inlet connection (24) on the front of the machine. The machine has a CIP washing programme permitting thorough, safe washing of the machine without dismantling its parts; it will therefore be necessary to prepare the required connections between the CIP washing pump and solutions and the mix pipe.
Make sure that the mix flows spontaneously to the machine connection (24) , and does not need to be suctioned by the freezer pump; this may be done by simply positioning the aging vats higher than the freezer (check that the spontaneously flowing supply is sufficient even when the mix level in the containers is low), or by installing a suitable centrifugal pump close to the vats. Take care to ensure that there is no air getting into the pipes, which could pollute the product and result in fluctuation of ice cream overrun.

CAUTION:

Pipes must be dismantled and washed thoroughly after completing this procedure to ensure that no hard solid particles are conveyed toward the freezer mix pump. This is very important as solid particles such as metal burr or welding residues could severely damage the freezer pump and will invalidate the guarantee.

Connect up the ice cream outlet to the utility. Use the shortest possible pipe, with as few curves as possible, and use a pipe which is shiny inside; the pipe does not need to be insulated. Make sure that ice cream pressure in the cylinders does not exceed 12 bar (the absolute maximum permitted value); if this should occur, move the freezer closer to the ice cream utility and/or use hot gas to produce softer ice cream.

4.2.3 Compressed air connection

Connect the compressed air supply pipe to the connection on the rear of the machine; it is recommended that an easily removable tap and connection be assembled close to the machine connection.
The supply pressure measured on the machine must never drop below 6 bar. It is strongly recommended that the compressed air supply in the place of installation be fitted with an air drying system and A0 filters to remove oil vapours and residual fine particles.

4.2.4 Electrical connection

CAUTION:

Electrical connection must be made exclusively by competent technicians who are familiar with safety legislation and authorised to perform and certify electrical installations.

Check the identification plate to make sure that the machine is compatible with the site's power supply. Connect the machine's power supply to the site's distribution panel and protect it with a suitable device, complying with all regulations for correct electrical installation in effect in the place of installation.
We recommend installing an automatic circuit breaker on the distribution panel, complying with local regulations. Great care must be taken to ensure correct connection with the earth, as incorrect connection could cause severe damage to the machine's electronic parts and injury or death to the operator.
The section of the power supply cable must be determined on the basis of its length and the grid

used during testing prior to shipment; if this cable is not long enough, it must be replaced in its entirety, without making any connections.
The machine's electrical installation includes a device for checking that phase sequence is correct to ensure that the motors turn in the right direction; if the machine does not work after connection, but the power on indicator light (1) comes on, two of the three wires in the machine's cable must be reversed on the distribution panel which supplies the machine.

4.3 Installation check

Check that connections have been made correctly:

a. Slowly open the cooling water intake tap and check that there are no leaks. Open the outlet tap and check that water can flow freely and that any air in the circuit has been expelled (this involves turning on the machine's cooling compressor because of the pressure valve which blocks the flow of water - see below).

b. Turn on the compressed air supply tap and check that there is no leakage and that pressure is between 6 and 10 bar. If the installation does not have a drier, bleed condensation from the line before turning on the tap on the machine.

c. Turn the main switch on the machine's rear panel to the (I) position.
Release the emergency button (1). Check that the power on light and the indicators come on. If only the power on light comes on, change the direction of rotation of the phases by switching the positions of two wires in the machine's power supply cable on the distribution panel (refer to installation instructions); all motors will then turn correctly in the direction indicated by the arrows in figure 4.5.

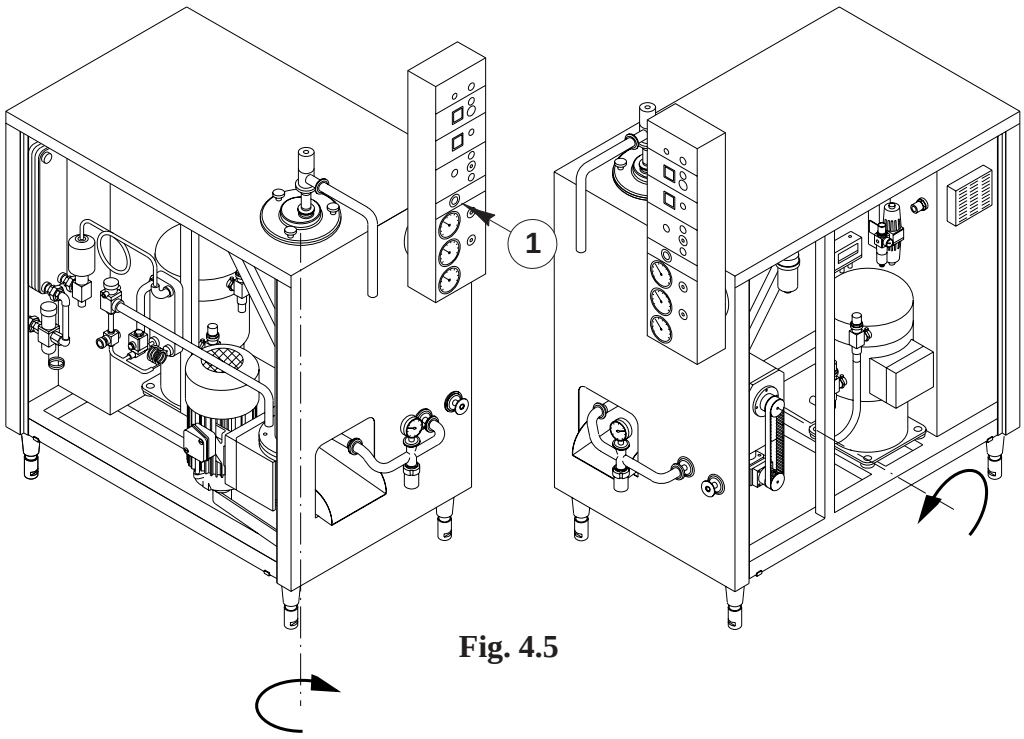


Fig. 4.5

HOYER FRIGUS 400

5 - SET-UP

Contents

5.1 Control panel settings

Description of the controls – Figure 5.1

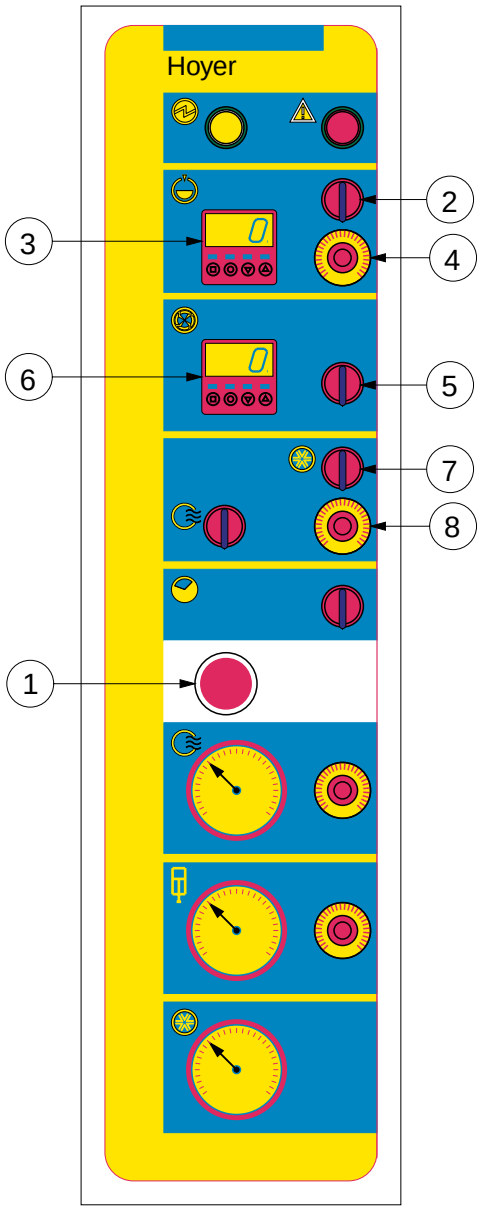


Fig. 5.1

Emergency
The machine shuts down completely if the emergency stop button (12) is pressed.

(Mix) feed pump
The illuminated switch (2) is turned clockwise to turn on the feed pump, and will light up. The display (3) indicates the rate of flow of the pump in l/h of mix. Speed may be controlled using the potentiometer (4).

Dasher
The illuminated switch (5) is turned clockwise to turn on the dasher, and will light up. The ammeter (6) displays the power consumption of the dasher and therefore the hardness of the ice cream – on reaching maximum consumption the hot gas device is activated at 100% until power consumption drops to normal levels. If power consumption continues to rise notwithstanding hot gas activation, the refrigerator compressor is shut off. This prevents excessive hardening of the ice cream, which could stop the dasher. When the dasher is stopped the hot gas device comes on for 30 seconds to prevent ice from forming in the cylinder.

Refrigerator compressor
Illuminated switch (5) is turned clockwise to turn on the refrigerator compressor, and will light up. Switch (5) is active only if the dasher is operating.

Hot gas
As mentioned earlier, the hot gas is activated automatically on excessive input or shut-off of the dasher; in the former case until power consumption is reduced, and in the latter case for a fixed time of 30 seconds. The hot gas device can also be activated manually with the potentiometer (8) to reduce ice cream hardness.

Overrun control
The illuminated switch (1) is turned clockwise to turn on the compressed air intake to the supply pump and will light up to indicate activation. Pneumatic regulator (2) is used to set the pressure – read on

pressure gauge (3) – and therefore the quantity of compressed air introduced into the supply pump to obtain the required overrun. The greater the pressure of the compressed air introduced, the greater the overrun obtained, up to the capacity of the mix. Over this limit the compressed air cannot be absorbed by the ice cream, and is expelled separately. Switch (1) is active only if the pump and refrigerator compressor are operating.

5.2 Ice cream pressure setting

Ice cream pressure is adjusted using the pneumatic pressure regulator (4). Pressure is indicated by the pressure gauge placed on the front of the machine, specifically on the pipe between the pump and the cylinder. For good ice cream quality, the pressure should normally be between 4 and 8 bar.
The safety valve opens automatically if the pressure in the cylinder, which appears on the pressure gauge, exceeds 12 bar; this prevents pressure from damaging the freezer.

WARNING:
The adjustment described above takes effect after an interval of time which varies according to the operating parameters set.
Wait for the gauge (6) reading to stabilise before proceeding with further adjustments.

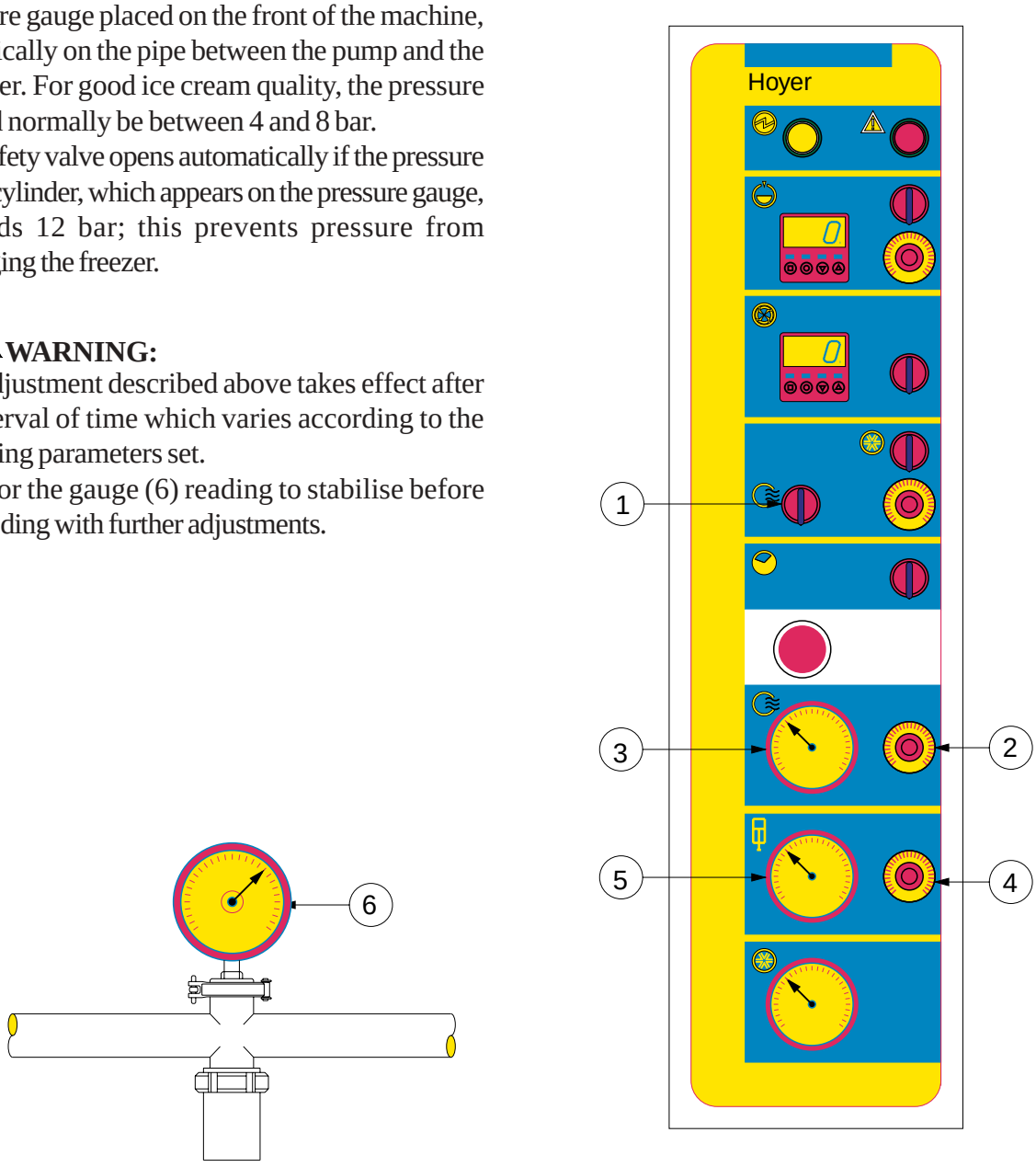


Fig. 5.2

5.3 Emergency stop

If danger should arise during production press the emergency button (1) to shut down the machine completely.

To reset the machine after an emergency stop:

- Release the emergency button.
- Activate the injection of hot gas by turning potentiometer (2) for about 30 seconds.
- Restart the freezer functions, including the pump, the dasher, the refrigerator compressor, and the sanitised air plant.
- Normal production now resumes.

WARNING:

Do not use the emergency button to stop the machine during regular operation.

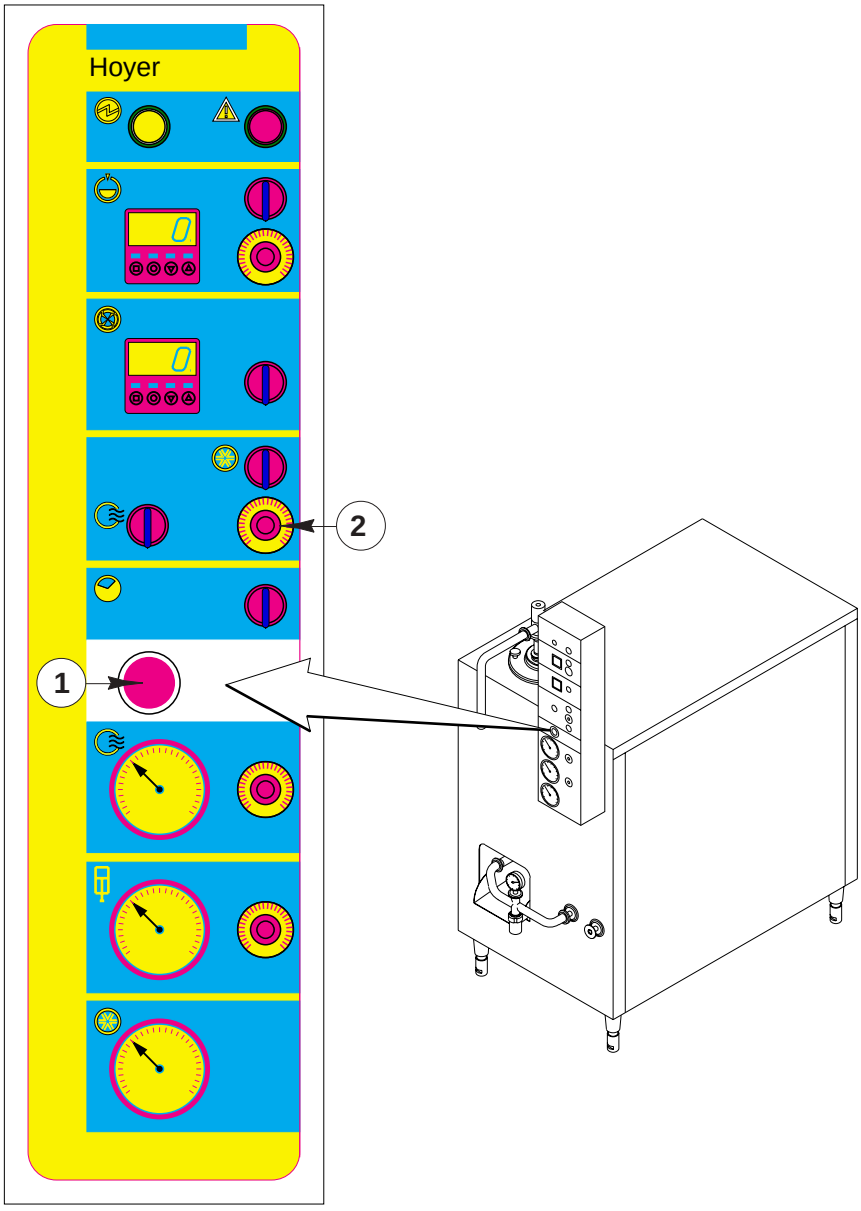


Fig. 5.3

HOYER FRIGUS 400

6 - OPERATING PROCEDURES

Contents

6.1 Preliminary checks

Perform the following checks before starting production:

a. Check that the machine is stable and has been levelled, and adjust feet if necessary.

b. Check that the main switch is on.

c. Check that the water and compressed air valves are open.

d. Check that the emergency stop button (1) has been released.

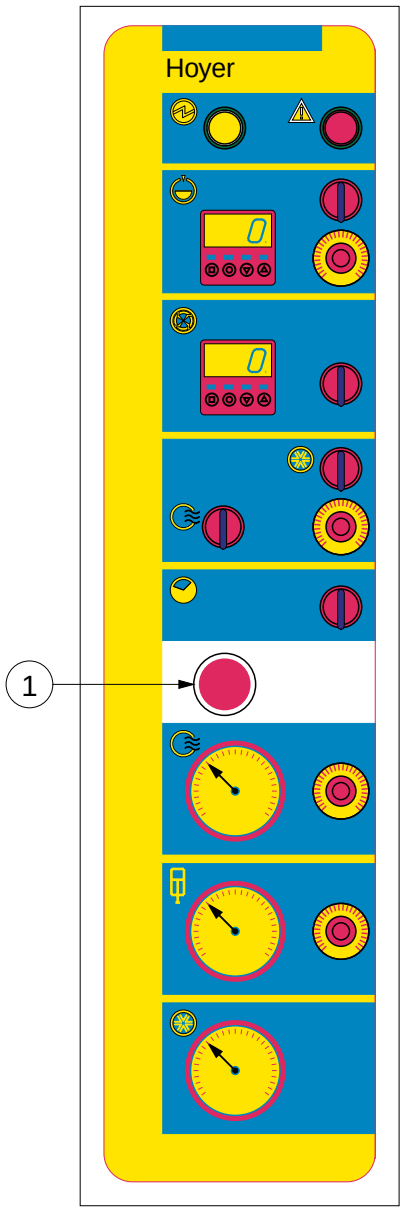
e. Check that the clamp fittings are tightly fitted.

f. Check that the safety valve (2) is correctly fitted.

g. Check that the mix intake (3) and ice cream outlet (4) pipes are fitted correctly.

h. Check that the all panels are assembled and fitted.

i. Check that the machine has been sterilised.



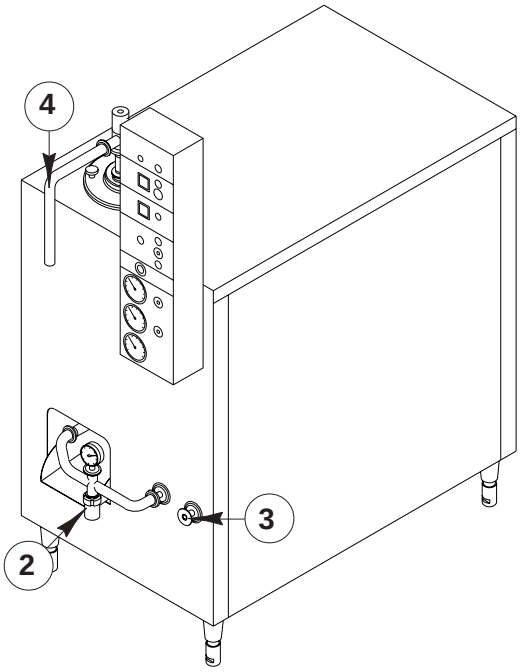


Fig. 6.1

6.2 Start of production

a. Connect the pump intake to the mix container.

b. Check that the power ON indicator (1) on the operator panel is on.

c. Start the pump with the switch (2). Mix flow in litres/hour corresponding to pump speed will be shown on the indicator (3).

d. Wait for mix to start coming out of the freezer outlet pipe.

e. Reduce pump speed to its minimum with the potentiometer (4).

f. Start the dasher with the switch (5) and check that the switch indicator light comes on.

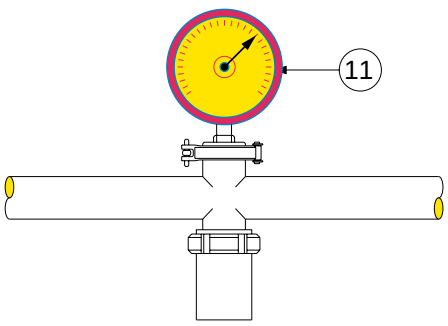
g. Start up the refrigerator compressor using the switch (6). Cooling will begin and the mix contained inside the freezer cylinder will begin to harden.

h. Start up the sanitised air plant with the switch (7). Check that the switch light comes on.

i. Use the regulator (8) to adjust the percentage of sanitised air to be injected into the mixtures. The regulation takes effect after a few minutes.

j. The hardness of the ice cream can be monitored on the gauge (9) which measures the amount of current absorbed by the dasher motor, proportionate to the hardness of the ice cream.

k. When the ice cream takes on the correct consistency, use the potentiometer (4) to increase pump speed slowly up to the desired rate of flow.



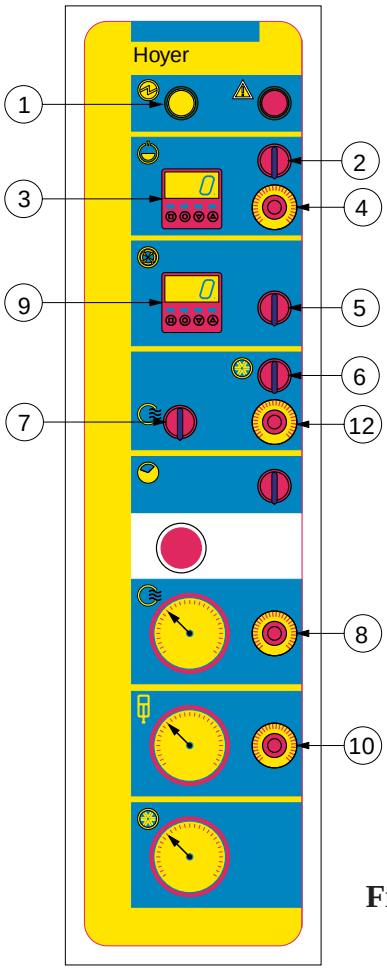


Fig. 6.2

l. Set the pressure of the ice cream inside the cylinder with the regulator (10), which activates the pneumatic valve set above the cylinder. Check that the ice cream pressure inside the freezer cylinder is between 4 and 8 bar on the pressure gauge (11).

The pressure should not exceed 10 bar, and can be reduced as follows:

- check correct adjustment of (10);
- make sure that the ice cream outlet hose is not pinched and that it is no longer than 3 metres;
- adjust the hot gas regulator with the potentiometer (12) to soften the ice cream.

If excessive pressure is due to low production, it may be necessary to increase pump speed using the potentiometer (4).

6.3 Production changeover

If production of different flavours of ice cream is organised so as to produce lighter coloured flavours first and successively produce darker and darker flavours, product changeovers will be very quick and involve very little waste.
All that need be done in this case is switch the mix supply from one flavour to another; if the pipes from the containers are set up with switch taps all that need be done is close one tap and open another, without stopping the freezer.

If it takes more time to change the mix and the machine must be stopped, proceed as follows:

a. Turn off the refrigerator compressor by turning the switch (1) anti-clockwise.

b. Turn off the feed pump by turning the switch (2) anti-clockwise.

c. Turn off the dasher by turning the switch (3) anti-clockwise.

d. Disconnect the supply to the freezer (4) from the vat containing the mix for which production is to be stopped, and connect it up to the container containing the new (darker) mix to be produced.

To start production again:

e. Turn the pump on at low speed using switch (2) and potentiometer (5).

f. Start up the sanitised air plant using the switch (11).

g. Wait until mix starts to come out (6).

h. Turn on the dasher with the switch (3).

i. Turn on the refrigerator compressor with the switch (1).

j. Adjust the quantity of sanitised air let into the mix using the pneumatic regulator (7).

k. Wait until the ammeter (8) indicates that the ice cream is sufficiently hardened.

l. Increase pump speed to obtain the desired ice cream production speed using the potentiometer (5).

m. Set ice cream pressure using the regulator (9).

n. If necessary, adjust the hardness of the ice cream with the potentiometer (10).

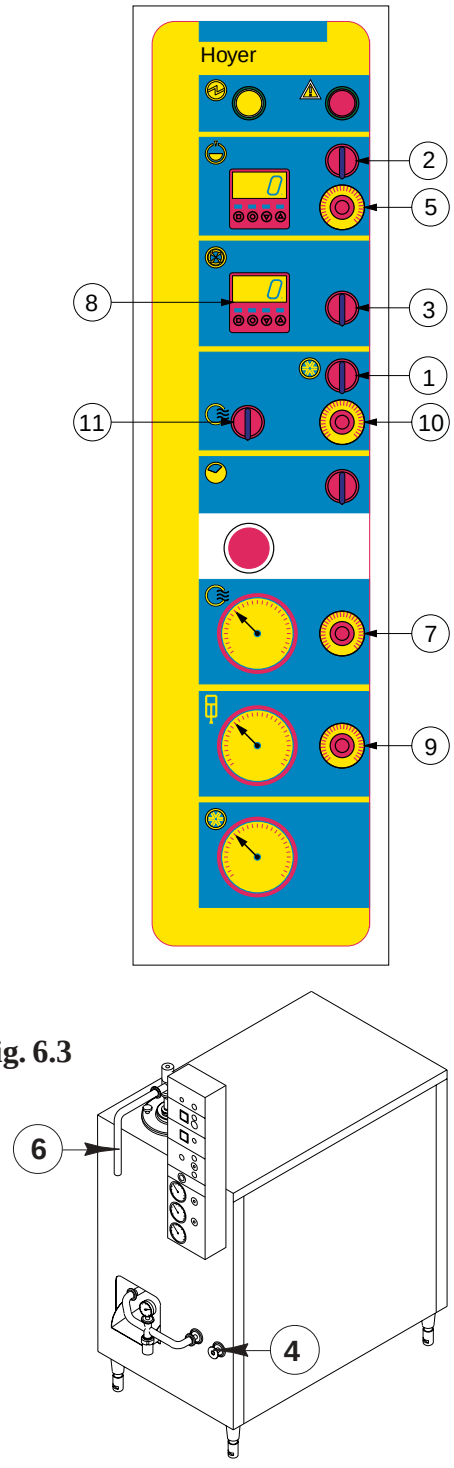


Fig. 6.3

6.4 End of production

a. Turn off the refrigerator compressor by turning the switch (1) anti-clockwise.

b. Turn off the feed pump by turning the switch (2) anti-clockwise.

c. Turn off the dasher by turning the switch (3) anti-clockwise.

d. Slowly release ice cream pressure in the cylinder until the pressure gauge (4) indicates zero using the regulator (5) and wait for remaining ice cream to come out of the cylinder.

e. Connect up the pump intake and ice cream outlet to the CIP washing pipes.

f. Start up the CIP washing cycle by turning on the CIP washing pumps (not included in the supply of Frigus 400) and turn on the freezer CIP cycle using the switch (6).

For additional washing instructions please refer to the section on CIP washing in this manual.

WARNING:

Do not carry out CIP washing without turning on the CIP cycle with switch (6): this would result in insufficient flow for washing.
Do not turn the pump or dasher onto continuous operation during washing: this could cause serious damage to mechanical parts due to the lack of lubricant.

g. Once the wash cycle has been completed (duration must be determined by experience, and depends on conditions of use) rinse the system with cold clean air. Never leave the machine full of aggressive cleaning solutions which could corrode metal parts and damage seals.
Turn off the main switch at the back of the machine to leave the freezer in safe condition disconnected from the electrical supply.
Check that all indicator lights are off.
Turn off compressed air and cooling water supply taps.

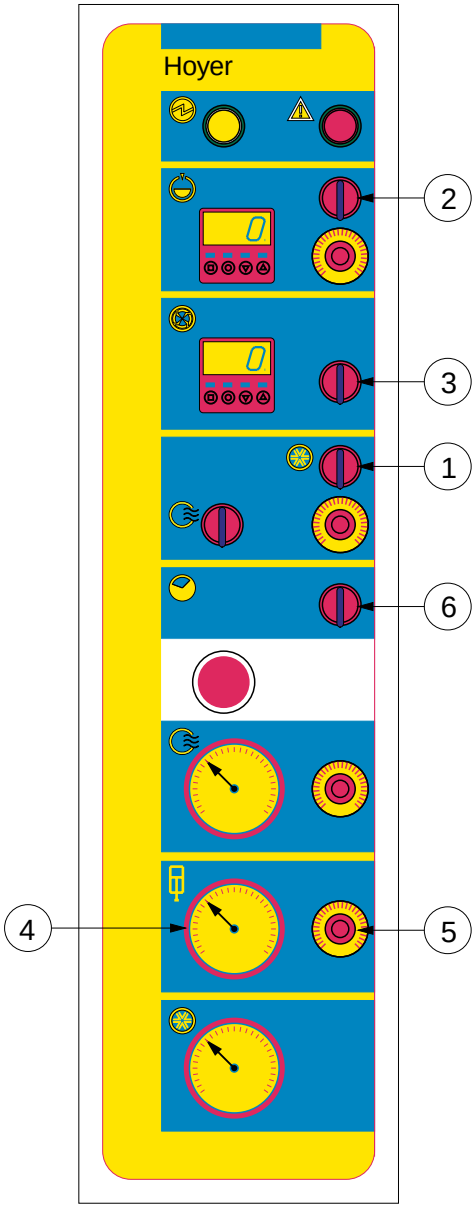


Fig. 6.4

The CIP washing cycle described above is the best way of washing the machine with little need for labour. If the washing system is not available and the machine must be washed manually, it will be necessary to dismantle a number of parts and reassemble them very carefully after washing.
In this case, proceed as follows:

a-d. Turn off the machine as described in points a through d above.

e. Disconnect the mix supply from the vat and supply the freezer pump with warm water, no hotter than 60 to 65ºC.

f. Start up the dasher using the switch (3- 6.3).

g. Start up the pump using the switch (2- 6.3).

h. Let hot water flow through the machine until the water flowing out of it is fairly clean. Keep washing as short as possible to prevent damage to the pump.

i. Stop the dasher and the pump by turning the switches (2- 6.3) and (3- 6.3) anti-clockwise.

j. Disconnect the pump delivery from the cylinder intake (1) to let air out.

k. Remove the cover (2) by unscrewing the knobs holding it in place.

l. Disconnect the pipes and the valve (5) on top of the cover.

m. Remove the dasher (3) using the tool provided, and dismantle the blades (6). Wear strong non-slip gloves to protect against cuts from the blades.

n. Dismantle the cylinder bottom (4).

o. Wash all components thoroughly, immersing them in a solution containing the recommended percentage of an appropriate detergent.

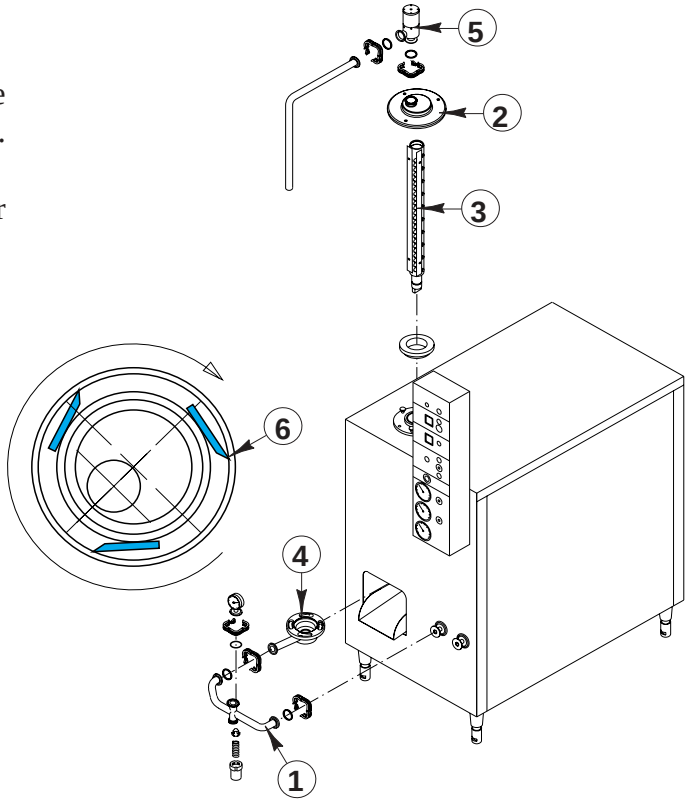


Fig. 6.5

p. Rinse well in running water.

q. Reassemble the parts in precisely the same position as before.
Be very careful when positioning the blades (6); the sharp part must be facing the cylinder. The latch on the cover (2) of the cylinder between the knobs is connected with a safety system; when closing the cylinder again, tighten up the knobs (by hand) to enable machine operation.

WARNING:

To prevent blows that could damage the freezer cylinder, a "shaft raiser ring" is supplied. The ring must be positioned on the cylinder as shown in the figure below. Then assemble the shaft (3), being very careful not to hit and damage the ring on the mechanical seal at the bottom (4). Finally, remove the ring and continue assembling all parts.

r. Sanitise the freezer by pumping a sterilising solution. Rinse and then drain the solution.

s. Before beginning production, it is recommended that rinse water be pumped through the system for 2 to 3 minutes. Drain the water by disconnecting the pump from the cylinder.

t. The freezer is now ready for use again.

HOYER FRIGUS 400

7 - CLEANING AND MAINTENANCE

Contents

7.1 Washing

Washing of a machine used to process foodstuffs normally involves the following operations:

- Prewash with hot water to remove most of the dirt.
- Basic wash to remove grease residues.
- Acidic wash to remove limestone deposits
- Disinfecting to remove bacteria.
- Rinse with cold water.

Limestone deposit formation is reduced considerably at the low temperatures of freezers; this means that it is not necessary to carry out an acidic wash every day, provided that the conditions of operation and the hardness of the water used permit. It may be sufficient to carry out an acidic wash only once a week.

In any case, the effectiveness of the washing procedure must be tested by experimentation and adapted to suit the machine's specific conditions of use.

When selecting a detergent solution, it is important to consider ease of use and safety of use for operators and for the materials out of which the machine is made. In order to assist users in the choice, a number of examples of suitable products (which are equivalent to one another) made by well-known manufacturers distributed all over the world are listed below. It is very important to comply with the precise concentrations specified.

WARNING:

The instructions given below represent general guidelines for washing. It may be necessary to adapt the procedure to the specific conditions of operation, and the actual effectiveness of the method must be systematically verified periodically using appropriate instruments. Tetra Pak Hoyer shall not accept liability for damage resulting from inadequate sanitation of the machine.

7.1.1 CIP washing.

CIP (Cleaning In Place) washing permits cleaning of the internal parts of the machine which come into contact with the product with no need to dismantle the machine.

If you have no centralised washing system, you will at least need a container and a pump, as shown in the illustration:

1. 1. Prepare washing solution at the correct temperature for the stage in the washing cycle to be performed (refer to table of wash stages and conditions) in an appropriate recipient. Fig. 7.1 illustrates the Hoyer wash tank (1) with built-in pump (2).

2. Start the CIP wash cycle using the switch (refer to the end of production instructions in section 6.4 of this manual).
   In this condition the pump by-pass valve and the ice cream output valve are open at all times to maximise flow of cleaning solutions, while the dasher pump works intermittently. The dasher and pump work for 5 seconds per minute throughout the duration of the wash cycle, so that they can be washed without causing excessive wear or severe damage to mechanical parts due to lack of lubrication.

3. Start up the wash tank pump. The wash cycle will be carried out as follows:

a - a - Prewash with hot water.
b - Detergent wash. Use an alkaline detergent which is non-caustic and does not form foam (containing a mixture of alkaline, sequestering, anti-corrosive and surfactant agents) with a pH of approximately 11 at a concentration of 1%. Use a concentration of 1.2% to 1.6%, depending on how dirty the machine is and how hard the water supply is.
c - Rinse with cold water.
d - Descaling wash. Use buffered phosphoric acid in a concentration of 0.5% to 1%.
e - Rinse with cold water.
f - Disinfectant wash. Use a moderately alkaline active disinfectant in a concentration of 1% to 1.2%.
g - Rinse with cold water.

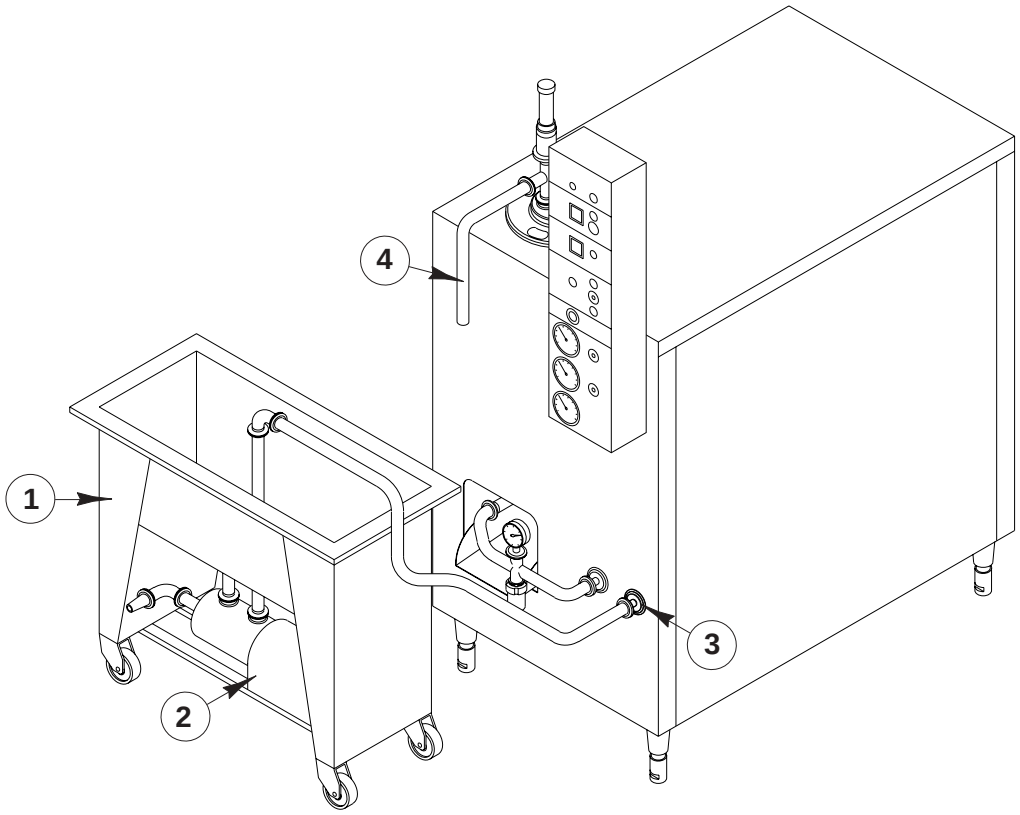


Fig.7.1

The appropriate flow rate for good CIP washing is about 1, 5 m/s in the waterspout of the frigus. This implies that a waterspout of 1 1/2" has a flow rate of 5000l/h. In such flow conditions, the pressure drop is of about 2 bar. The CIP washing pump (2) thus has to be able to ensure these features of head discharge.

Wash stage	Recommended products	%in water	°C	Minutes	Notes
Prewash	Water	100	50	5	drain away
Detergent wash	SU157 (Diversey Lever) P3-N421 (Henkel Ecolab)	1,2-1,6	max. 70	15	recycle
Rinse	Water	100	20	5	drain away
Descaling wash	SU475 (Diversey Lever) P3-PE4 Spezial a (Henkel Ecolab)	0,5-1	max. 70	10	recycle
Rinse	Water	100	20	5	drain away
Disinfectant wash	SU330 (Diversey Lever) P3-Dix forte (Henkel Ecolab)	1 - 1.2	20	10	recycle
Rinse	Water	100	20	10	drain away

4. Upon completion of the wash programme, stop the tank pump and disconnect the pipe connecting the pump with the cylinder. Wait until all water has flowed out, then turn switch (11) anti-clockwise to end the CIP washing cycle and reassemble the pipe.

5. After the washing programme, fill the machine with disinfectant solution.
   Connect the freezer mix inlet (27) to a container filled with disinfectant solution; start up the freezer pump and wait until solution flows out of the ice cream outlet pipe (28), then stop the pump. Drain the solution and rinse with clean water before starting production again.

WARNING:

Do not use any acidic cleaning solutions or solutions containing chlorine other than those indicated.
Chlorine will corrode and rust the dasher and blades and corrode chrome. Some acids will corrode chrome.

NOTE:

After sanitising the machine, do not dismantle any components, to ensure that it is kept clean.

WARNING:

Liquid wastes must be disposed of as required by the legislation in the place of installation of the machine.

7.1.2 Washing the outside of the machine

Proceed as follows to wash the outside of the machine:

a- Prewash with hot water (50°C).

b - Detergent wash.
Use an alkaline foaming detergent or a gel with high grease emulsifying power in a concentration of 2% to 10%, depending on how dirty the machine is and how hard the water supply is. Leave to act for 10 minutes.

c - Rinse with water.
Remove all soapy, emulsified dirt.

d - Descaling wash.
Use an acidic descaler with low viscosity containing a mixture of wetting and emulsifying agents in a concentration of 2% to 3%. The minimum recommended contact time is 15 - 20 minutes.

e - Rinse with water.

f - Disinfectant wash.
Use a suitable disinfectant diluted in water in a concentration of 1% to 1.2%. The minimum recommended contact time is 15 - 20 minutes.

g - Rinse with water.

CAUTION:

Do not use high pressure jets of water.

Recommended products:

Detergent	Descaler	Disinfectant
SU928 (Diversey Lever) SU616 (Diversey Lever)	P3-topax 99 (60°C) (Henkel Ecolab)	P3-topax 99 (60°C) (Henkel Ecolab)

7.2 Maintenance

7.2.1 Mechanical maintenance

- **Transmission belt**
  Proceed as follows to replace the belt connecting the main motor with the dasher:
  Slacken the lock nut (1) and the nut (2) so that the belt is no longer under tension.
  Remove and replace the belt.
  Tighten up the belt using the nut (2).
  While tightening up the belt, check that it is completely inside the driven pulley and tighten up the lock nut (1).
  Start up the dasher again, and check that the belt stays in position and does not tend to ride up and down on the driven pulley.

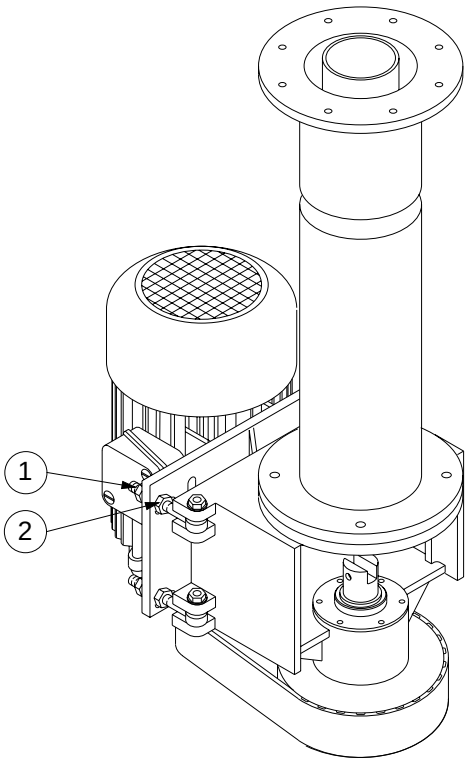
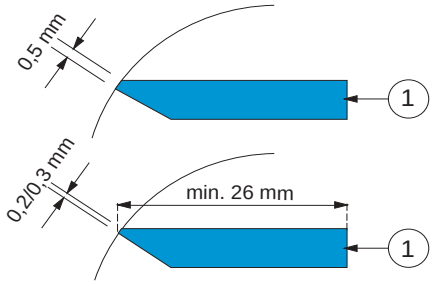


Fig.7.2

- **Rotating seal (Fig. 7.4)**
  Check the rotating seal (5) assembled on the lower end of the dasher and coupled to the bush (6) fastened to the bottom (11) by the ring nut (12).
  The rotating seal has a housing made of hard metal which, under pressure from the spring (7), rotates against the face of the bush (6).
  Check that the surface of the housing has no scratches which could affect its hold.
  Use fine emery paper to polish the two surfaces. Rub them first against a very hard surface (glass), then against one another.
  Replace the ring gaskets (48) if they are worn.

- **Dasher (Fig. 7.4)**
  Check that the eccentric (13) turns freely inside the dasher. If this is not the case, dismantle the elastic ring (14) and remove the dasher (15) and the eccentric (13) from the support (16) and check the condition of the bushings. Lubricate the bushings before reassembling the dasher.

- **Scraper blades**
  Inspect the scraper blades (1).
  They must be assembled in their pins so that they can tilt when the dasher rotates.
  If the edge of the blade is not in perfect condition, the blade should be replaced.



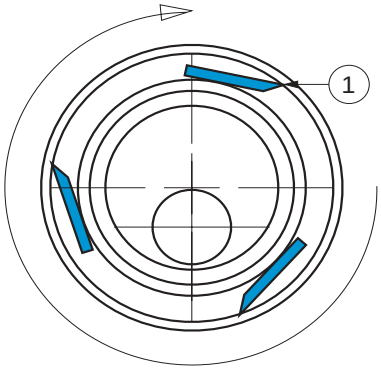


Fig.7.3

☞ **NOTE:**

The blade may be sharpened, but this requires use of a special machine. The blade needs sharpening if the width of the cutting end exceeds 0.5 mm (Fig. 7.2).
After sharpening the thickness of the cutting edge must be about 0.2 - 0.3 mm (Fig. 7.3).

CAUTION:

It is important to assemble the blades as shown in Fig. 7.3

- **Dasher motor drive (Fig. 7.4)**
  If the dasher is noisy during operation, dismantle the support (1) and pull out the shaft (2).
  Disassemble the bearings (3) and gaskets (4), check their efficiency and replace them if necessary.
  Reassemble carefully in inverse order.

- **Cylinder bottom (Fig. 7.4)**
  Inspect the rotating seal sliding bush (6).
  Check for wear on the gasket (5), spring (7), and lip seals (8) and replace if necessary.

- **Cylinder lid (Fig. 7.4)**
  Check for wear on the gasket (9) and replace if necessary.

- **Ice cream mix pipe connection seals** (10)
  Check for wear and replace if necessary.

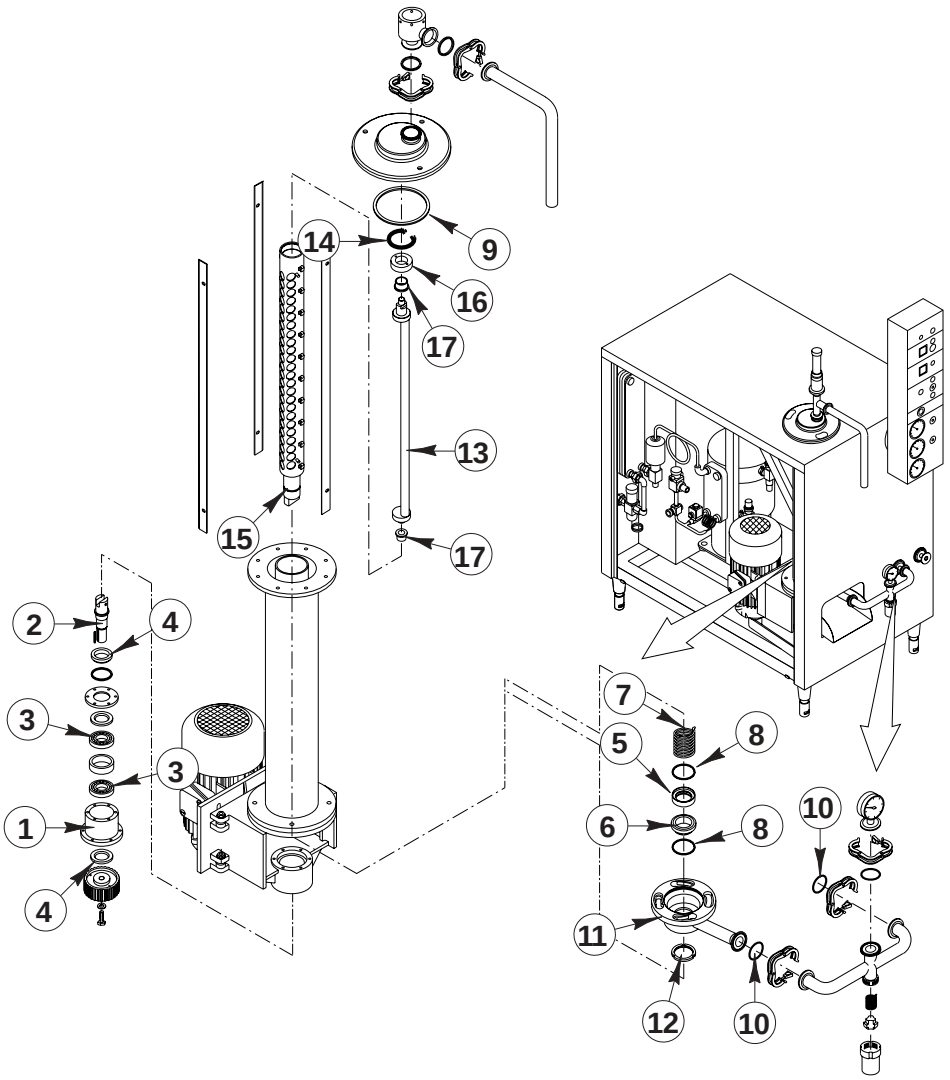


Fig. 7.4

Mix feed Pump (Figure 7.5)
Take out the rotor (6) and check the state of wear of the surface.

CAUTION:

The correct functioning envisages 0,05 mm backlash between the rotor and the jacket, therefore avoid polishing the rotor with a cloth.

Non-return valve Inspection (Figure 7.5)
Check the integrity of the air inlet non-return valve (1) into the pump.
In case it is necessary, replace the gasket (2).

Pump timing Inspection (Figure 7.6)
Place the piston (1) in the bottom dead centre.
Make sure that the reference notches of the driving pulley (2) and of the driven pulley (3) are both turned up in the upright position.
If the position of the notches is wrong, proceed with timing.

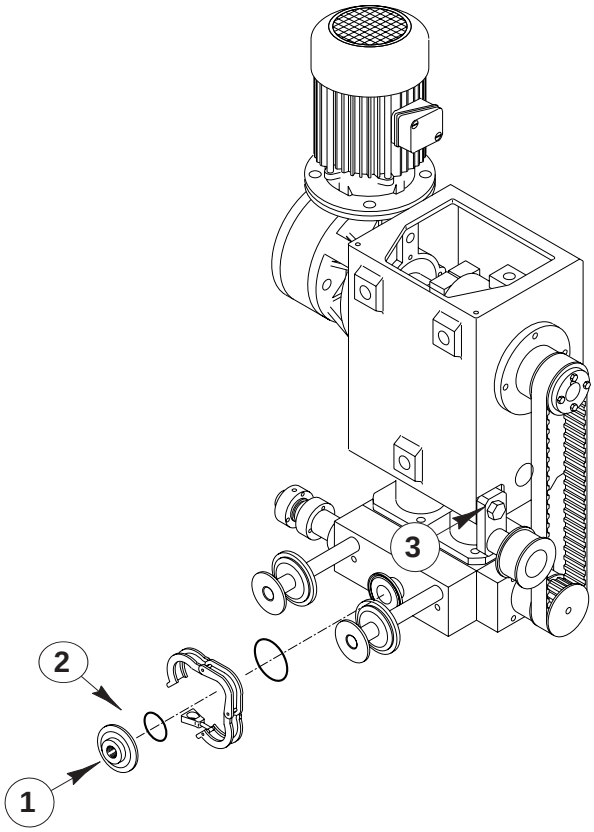


Fig. 7.5

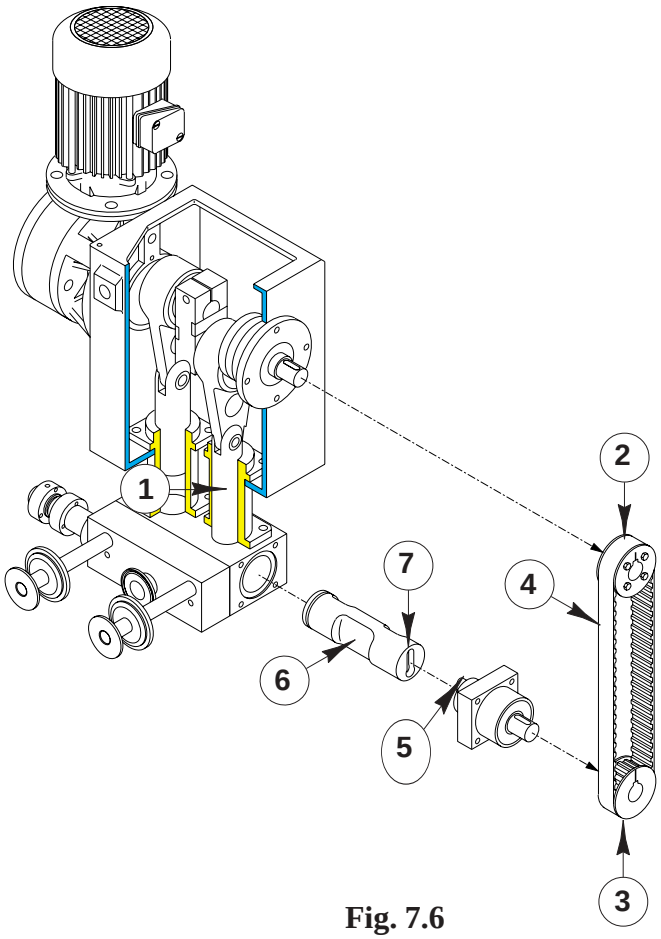


Fig. 7.6

Pump Timing (Figure 7.7)

Following disassembly for replacement or inspection of a mechanical component, it is necessary to time the fuel pump again.

Place the piston in the bottom dead centre.

Loosen the backstand (1), unscrew the pulleys blocking screws (2) and (3) take out the two pulleys and the belt at the same time.

Reinsert the pulley (3) on the centre shaft and continue with the timing manually, by turning the pulley (3) until the notch on the pulley is turned up in the upright position.

Take out the pulley again (3), taking care not to change the rotor's position. Reassemble the two pulleys and the belt at the same time. Check the alignment of the two notches and stop the pulleys with the proper screws.

If it were difficult to maintain the two notches aligned, loosen the four bolts (4) on the driving pulley (2) and rotate the pulley manually (3) by using a setscrew wrench until the reference notch is perfectly vertical. Screw the four bolts again (4).

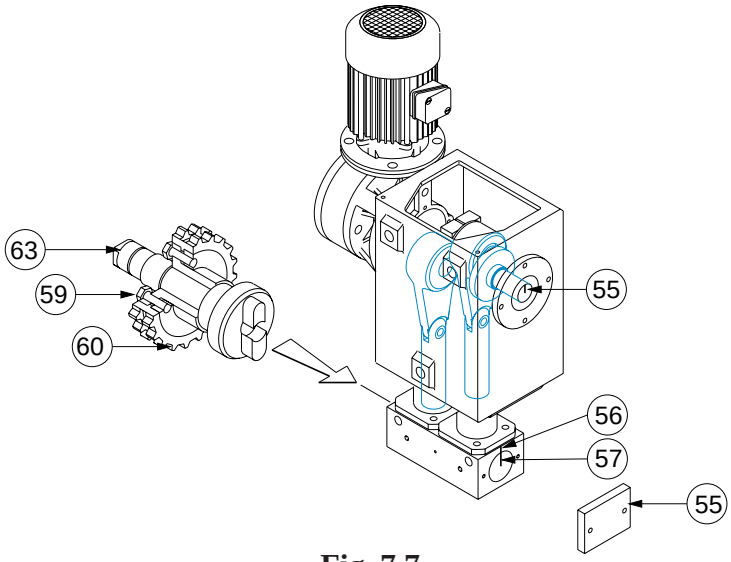


Fig. 7.7

Belt inspection (Figure 7.7)

Check the belt's tension (5) and eventually tension it by loosening the screw coupling (1).

Once the belt is tensioned, tighten the screw again.

Pistons repacking (Figure 7.8)

Take out the piston pin (1) connecting the piston-connecting rod.

Rotate the connecting rod (3), disassemble the gasket holder plate (2), and remove the gasket (4).

Reassemble the new gasket (4) paying attention not to pinch it.

Reassemble everything in reverse sequence.

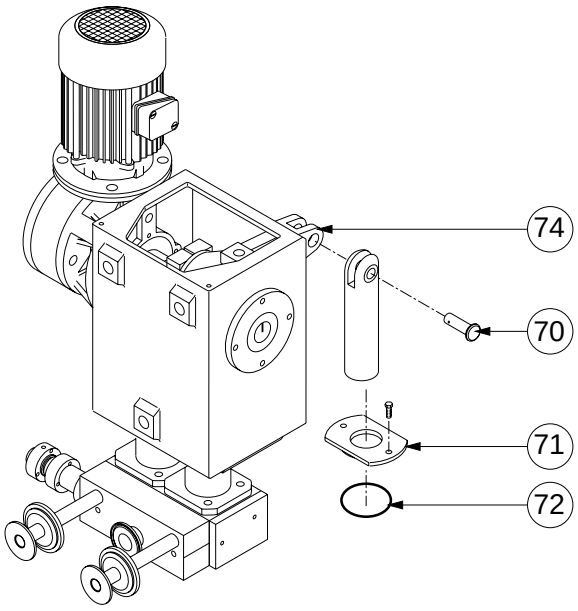


Fig. 7.8

Replacement of gaskets and backstand gear bearings

Unscrew the screw and release it from the screw coupling. Take off the snap ring (1), withdraw the pulley (2), and remove the gaskets (3) and the bearings (4). Reassemble all in reverse sequence.

Replacement of gaskets and rotor drive bearings

Disassemble the flange (5), take out the gaskets (6) and remove the snap ring (7). Extract the bearings (8). Reassemble all in reverse sequence.

Replacement of crankshaft bearings and gaskets

Disassemble the ratio motor (9), the flange (10) on the motor side, the opposite flange (11) and extract the gaskets (12) and the bearings (13).

Take out the crankshaft, disassemble the two semi-shafts (14 and 15) constrained by the clamp (16) and by the keys.

Disassemble the snap rings (17 and 18).

Disassemble the connecting rods (19) and take out the bearings (20) and the gaskets (21).

Reassemble in reverse sequence, paying attention to the alignment of the crankshaft that is achieved with the appropriate assembly of the keys.

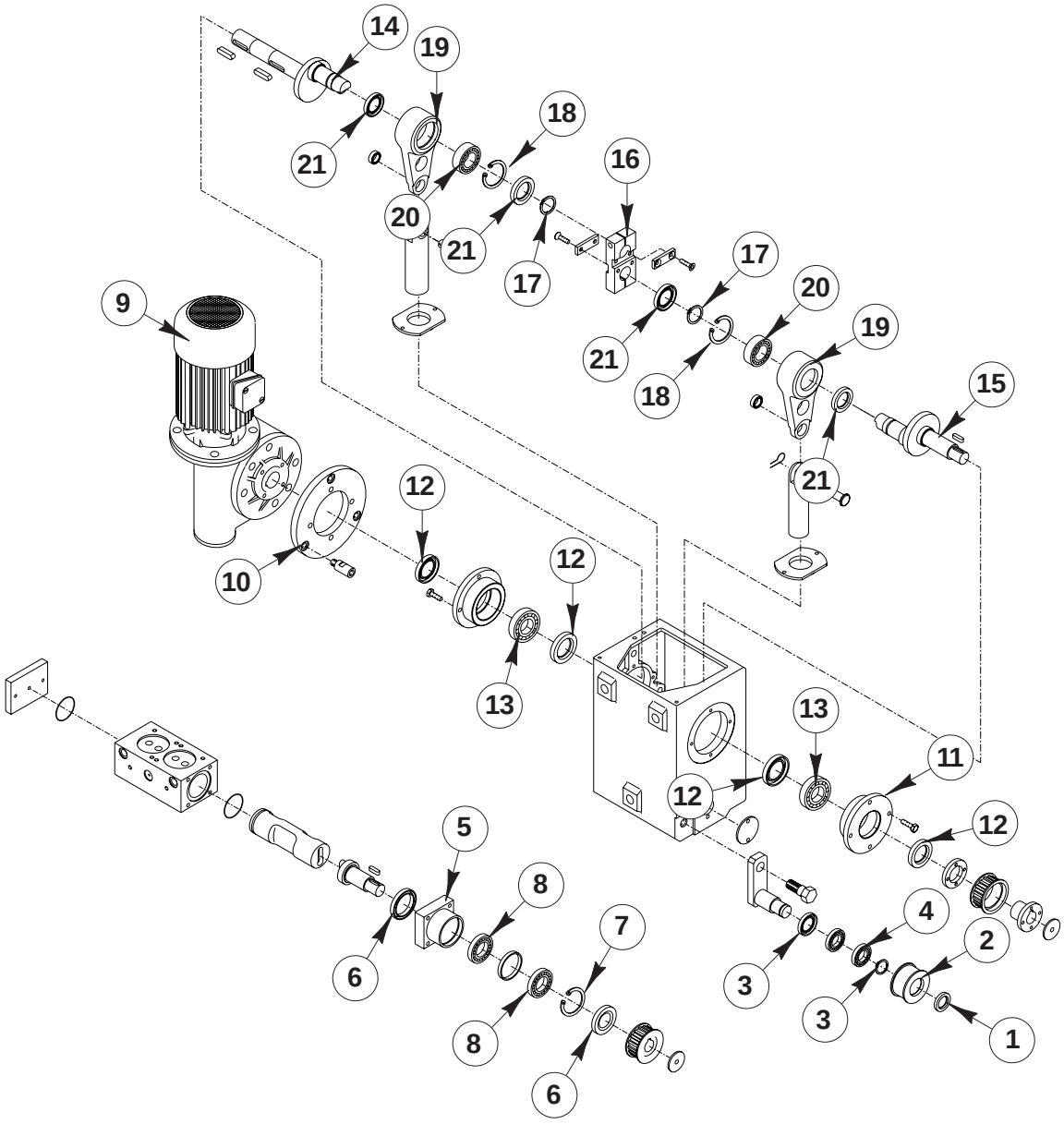


Fig. 7.9

7.2.2 Maintenance of the electrical system

The electrical system is conceived, designed and developed to provide maximum protection for the continuous freezer components.
When a motor stops due to overload, a red light comes on to indicate that a thermal switch has been tripped.
If the thermal is tripped again when it is reset, the problem or short circuit persists and it will be necessary to inspect the electrical system and possibly block mechanical components.

7.2.3 Maintenance of the refrigerating plant

CAUTION:

All repairs and inspections of the refrigerating plant must be performed exclusively by a qualified refrigerator technician.

Condensation

Coolant exiting the refrigerator compressor is condensed in the plate condenser by water, which may come from the water supply (or a well, or a circuit with a cooling tower). The Frigus 600 has a series of condensers with pressure valves which are factory set and keep condensation pressure at the optimal value (12 - 13 bar). If water from a water tower is used, it should be kept at the same temperature at all seasons, if possible (with a fan in the tower controlled by a thermostat) so as to keep the performance of the refrigerating plant uniform.
The condenser must be kept clean to ensure correct, efficient operation of the machine. All heat taken out of the ice cream mix and all energy consumed by the compressor to transfer this heat are transferred out of the system (in the cooling water) through the condenser. If the condenser is dirty, it will be difficult to get rid of the heat, and the freezer may not cool down sufficiently and may consume excess energy.
Decreased efficiency of the condenser is normally due to the combined action of particles of dirt in the flow of water and substances which have separated from the water (present even in very clean water).
Dirt particles, if large, will obstruct the passage of water; substances which separate from water and deposit on the exchange surfaces will obstruct the passage of heat.

If the motor compressor on the refrigerating plant shuts down, check the pressure switch and electronic protection (located in the terminal board above the motor compressor). This must be done before working on the electrical system. Pay careful attention to the wiring diagram.
The numbered terminal board appearing in the diagram mirrors the board installed on the freezer to make it easy to control it. Maintenance and repair operations should be performed by a qualified electrician.

Preventing soiling of the condenser

Prevent problems caused by dirt by keeping dirt out of the condenser. If cooling water comes from a circuit in which it is impossible to prevent entry of foreign particles (such as leaves, blades of grass or tiny insects in water from a tower or sand in well water), it will be necessary to decant and separate out these particles.
As specific protection for the freezer, one or more filters may be installed at the water intake to stop all particles over 1 mm (largest dimension). The size and type of filter must be determined according to the amount and type of dirt in the water.
To prevent efficiency from being decreased by substances separating out of the water, first analyse the water to determine what treatment would be best. All waters tend to corrode or scale the surfaces with which they come into contact; it is very difficult to achieve and maintain a balanced condition in which there is neither corrosion nor scaling.
The trend to corrode or scale depends on the type and amount of substances dissolved in water, the acidity of the water and the temperature at which it is used. It is recommended that users contact a specialist firm capable of recommending and supplying batching devices, substances, and procedures suited to the specific cooling water system in use.
This is particularly important in the case of water towers, where temperature, evaporation and continual ventilation with air in the environment can generate waters which are particularly polluted (by solid particles, algae, mineral salts, micro-organisms, gases, etc.) and damaging for the entire plant and the condenser in particular.

Keeping the condenser clean

When condensation temperature is excessive for the conditions of operation in effect, it is time to clean the condenser.

On a machine with an R22 condensation temperature should be between 33°C and 42°C if the water temperature is less than or equal to 29°C; about 3500 litres/hour of water will be required at a temperature of 29°C.

Check that these conditions are met and that all the rest is working properly before deciding that the condenser needs cleaning.

If the condenser does need cleaning, contact a qualified refrigerator technician who has the equipment required to carry out chemical cleaning.

WARNING:

Do not disassemble the condenser and disconnect it from the coolant pipes for cleaning.

The Frigus 600 is fitted with two connections for cleaning the condenser: one inside the machine, at the top of the condenser next to the coolant gas pipe (washing solution intake) and one on the outside halfway between the water intake and outlet (washing solution outlet). Both these connections are normally closed off.

Turn off the cooling water intake and outlet taps.

Use a closed washing circuit consisting of a container and a centrifugal pump as shown in the figure; connect the pump delivery to the washing solution intake (top inside) through a plastic hose. Connect another plastic hose to the washing solution outlet (halfway on the outside) to return solution to the container.

First let water run through to get rid of any solid particles in the condenser.

Then prepare a suitable buffered solution (such as Henkel P3 T 288) according to the manufacturer's instructions and put it in the container. Flush it through, following the instructions for use, until the solution's indicator (colour change, pH, etc.) indicates that scale has been removed. This may take a few hours.

CAUTION:

Under no circumstances should strong inorganic acids such as hydrochloric acid, nitric acid, or sulphuric acid be used for any reason. These acids are very dangerous and could cause irreparable damage to the condenser in only a few minutes.

Passivate and rinse according to the instructions; remove pipes and close connections up again. Open the cooling water intake and outlet taps again, and check that water is circulating normally with no leakage.

Thermostatic expansion valve

This valve is factory set during final testing to optimise the dependability and performance of the refrigerating plant.

The factory setting should not be changed for any reason. If the machine is not working properly, all parameters affecting performance should be checked, such as the temperature of incoming mix, wear on the scraper blades, and correct circulation of condensation water.

- If the refrigerating plant is not working as well as it should do, the reason may be:
  - insufficient condensation
  - inefficient thermostat valve;
  - dirty or blocked up filter on the line;
  - hot gas solenoid valve blocked up or open;
  - solenoid valve blocked up or closed;
  - low coolant level.
- Insufficient condensation may be caused by:
  - insufficient water coming from water supply: check that all taps (on the line that conveys water to the freezer) are open and water is flowing to the freezer properly.
  - optional pressure valve setting needs adjustment: adjust using the knob on its top.
  - if the optional water valve is set correctly, the temperature of the water (flowing out of the outlet with the system in operation) should have a temperature of 30 to 35°C.

- If the thermostat valve is faulty, it will stay closed, stopping the flow of coolant.
- If the line filter is blocked up, it will get covered with frost which will block the flow of coolant. Dismantle and replace it. It must always be replaced whenever the cooling circuit is opened.
- If the solenoid valve which controls the flow of hot gas stays open, it will compromise the performance of the refrigerating plant considerably. Check the solenoid valve and replace if necessary.
- The liquid solenoid valve automatically closes the liquid line every time the refrigerator compressor stops.
- If the valve does not open, the refrigerating plant will tend to idle, and the vacuum pressure gauge will drop below -35°C. If this occurs, check that the power is on to the solenoid valve coil. If so, replace the coil.
- If the electrical system is working properly and you have checked all the above, poor performance may be due to low coolant level in the refrigerating plant. This will result in formation of gas bubbles which may be detected by the indicator. When the coolant level is low in the refrigerating plant, identify the cause of the leakage before adding more coolant.

CAUTION:

Do not add coolant to the refrigerator circuit unless absolutely necessary.

The refrigerating plant will not work properly with too much gas in it.

7.2.4 Maintenance of the pneumatic system

- Periodically check the efficiency of the pneumatic system and check whether the filters are obstructed.
- Check that no mix is flowing back from the pump.
- Check the efficiency of the valves.
- If air flow is insufficient, replace filter cartridges; if not, refer to the table of work listed in the section on preventive maintenance.

CAUTION:

Do not open filters, especially the sterilised filter, unless there are problems with the pump's air supply.

7.3 Preventive maintenance

- **Every 6 months**

- Replace the sterilising filter.

CAUTION:

Do not open the filter cartridge package until ready to replace the filter. Handle with care.

- Replace the seal on the air intake check valve according to the instructions provided in the 'Mechanical maintenance' section.

- **Every 12 months**

- Replace the high yield filter (located at the bottom of the dual filter).
- Replace the active carbon filters (located at the top of the dual filter).

CAUTION:

Do not open the filter cartridge package until ready to replace the filter. Handle with care.

- **Every 3000 hours of operation**

- check chain tension and lubricate chain
- replace all seals on pump, dasher and pipes
- sharpen scraper blades, or replace if very worn

- **Every 6000 hours of operation**

- replace scraper blades
- replace all dasher brasses
- replace entire dasher rotating seal
- replace piston pins and brasses

7.4 Lubrication

Refrigerator compressor:
Polyester type oil: Mobil EAL Arctic 22 CC
ICI Emkarate RL 32 CF
Quantity: 4 litres
Life-long lubrication.

NOTE:

The compressor guarantee will remain valid only if one of the two oils specified above is used.
The compressor works only with these two specific oils. Ester oils must never be mixed with mineral oils and/or alcohol-benzene oils.
Do not use mineral oils on cooling circuit compo

Piston slide bearings:
Bearing grease.

NOTE:

Apply grease with a grease gun every 500 hours of operation.

Slide bearings:
Bearing grease.

NOTE:

Whenever parts are dismantled.

HOYER FRIGUS 400

8 - TROUBLESHOOTING

Contents

8.1 Troubleshooting

Problem	Cause	Remedy
Power light off	• Power failure. • Broken power light • General switch in "0" position. • General switch fault.	• Restore voltage supply. • Replace light. • Turn general switch to"1". • Replace.
No flow or insufficient flow of mix.	• No mix supply • Mix supply hose crimped or blocked. • Air bubbles in the supply hose. • The pump has stopped • The pump is badly timed	• Restore supply • Remove blockage/crimp. • Stop overrun, increase pump speed to recall mix rapidly into the cylinder, reset desired pump speed and restart overrun. • See problem "The pump stops, or does not start". • Retime the pump
The pump stops, or does not start.	• Switch fault. • Main motor fault. • Pump rotor seized. • Bearings blocked. • Inverter thermal cutout • Inverter foult. • Inverter in emergency state. • No compressed air	• Replace switch. • Replace/repair. • Remove rotor, check condition and if necessary replace. • Replace following instructions in "Mechanical maintenance" section. • Wait 20 seconds, then restart the pump • Replace. • Turn of the general switch and turn back on after a few minutes. • Ceck compressed air pressure
• **Mixer shaft stops or does not start.**	• Thermal cuteout tripped. • Switch foult. • Motor fault. • Build up of ice in the cylinder • Reduction gear fault	• Reset thermal cuteout • Replace switch. • Replace/repair. • Turn on hot gas. • Replace.

Problem	Cause	Remedy
• **The mixer shaft is malfunctioning.**	• Ice cream too hard	• Turn on or increase hot gas supply.
	• Scrape blades worn	• Sharpen or replace, following correct fitting procedure.
	• Reduction gear broken.	• Replace
Mix cooling problematic start-up	• Condenser out of or low on water.	• Check water supply
	• Hot water	• Check water temperature.
	• Refrigerator unit fault	• Call qualified refrigerator technician
Ice-cream too soft	• Excessive hot gas.	• Reduce hot gas supply
	• Excessive ice-cream production rate	• Reduce pump speed
	• Imput mix too hot	• Check that mix is at 4°C.
	• Water supply to condenser insufficient	• Check water supply. Adjust pressure valve(if present) as explained in the"Refrigerator unit maintenance" section.
	• Condenser cooling water too hot.	• Check temperature of tower water
	• Ice cream outlet valve too open.	• Increase pressure on ice-cream outlet pad.
	• No coolant gas.	• Check for leaks in refrigerator unit and reset gas charge.
	• Coolant gas filter blocked.	• Replace filter
	• Refrigerator unit fault	• Call refrigerator technicciian

Problem	Cause	Remedy
Overrun insufficient.	• Loss of pressure in compressed air system.	• Check compressed air system for leaks check solenoid valve operation.
	• Clogged filters	• Replace as described in the"Compressed air system maintenance" section.
	• Non return valve seal worn or dirty.	• Replace as described in the "Mechanical maintenance/ cleaning" section.
	• Water or mix in compressed air system	• Replace the O-ring as in point above and clean system.
	• Compressed air supply failure	• Reset
	• Overrun regulator fault.	• Replace
	• Wrong pump timing	• Time pump
	• Pump rotor worn	• Replace
Refrigerator compressor starts but shuts down immediately	• Condenser water supply closed	• Turn on faucets
	• Condenser water supply hoses pinched.	• Remove crimps.
	• Condenser water supply hoses of insufficient diameter	• Replace with hoses of diameter at least as that of the hose connections on the machine.

Problem	Cause	Remedy
The refrigerator compressor will not start up.	• Dasher off. • Thermal cuteout tripped. • Electronic overload tripped. • Switch foult • High-pressure cutoff switch tripped. • Low pressure cutoff tripped	• Restart dasher • Reset. • Reset by switching general switch off then on again. • Replace switch. • Check water temperature. • Turn on hot gas for abort 30 seconds
The compressor ices up.	• Condenser water too cold • Blades worn. • Thermostat valve fault. • Excessive quantiy of coolant gas.	• Check water temperature. • Replace. • Replace. • Unload gas and reload observing value in technical data.
Whole pump speed range not avalible.	• Inverter foult • Potentiometer fault	• Replace. • Replace
Hourly ice-cream production rate remains unchanged even after adjusting potentiometer P1.	• Inverter foult • Potentiometer fault	• Replace. • Replace
Hot gas activates before correct time.	• Instrument decalibrated.	• Calibrate instrument
Hot gas does not activate.	• Instrument decalibrated. • Instrument foult.	• Calibrated instrument. • Replace instrument
Hot gas activates but with no effect.	• Hot gas faucet closed.	• Open faucet

HOYER Frigus400 *N.COMMESSA* *13210152*

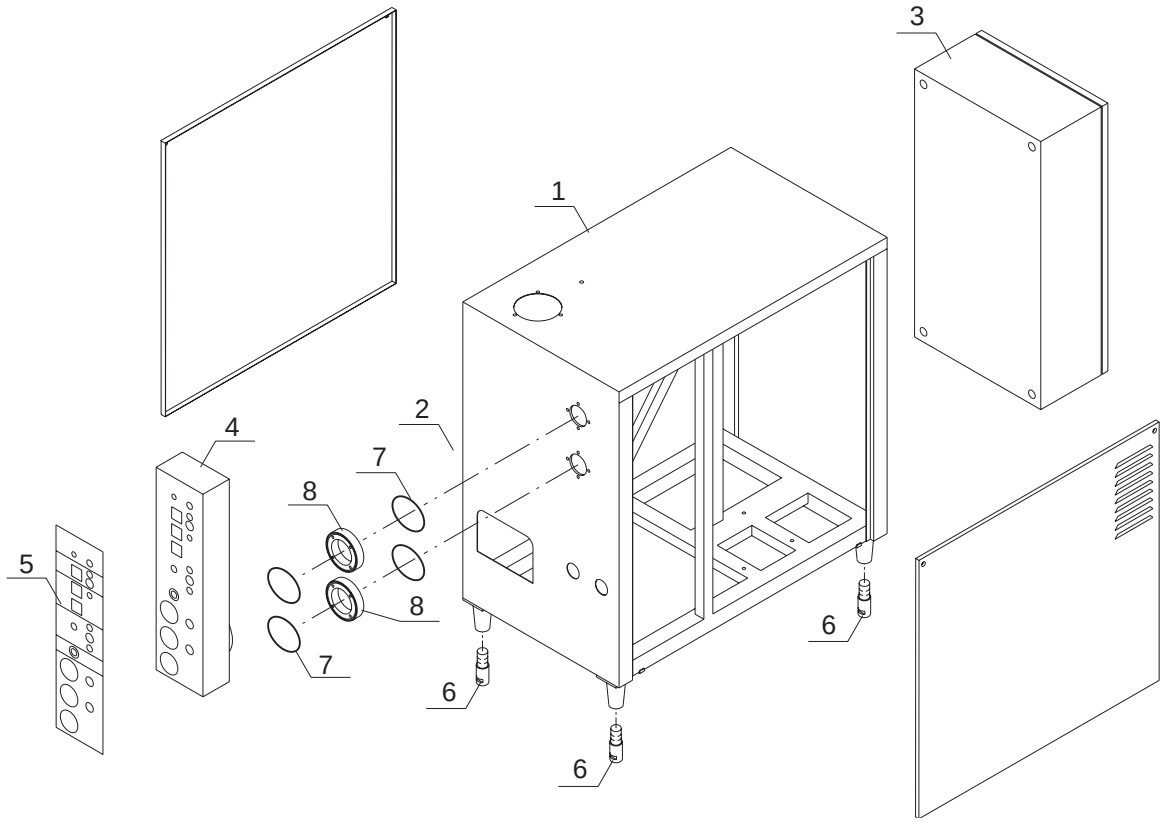
9 - PARTI DI RICAMBIO - *LIST OF SPARE PARTS - PIECES DE RECHANGE*

Indice - *Contents - Sommaire*

Telaio **1/1** **13020355**

Frame - Châssis

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	13020182	1	Carpenteria	Carpentry	Charpenterie
3	12020094	1	Cassetta Q.E.	Electrical cabinet	Armoire électrique
4	12020098	1	Cassetta Q.E.	Electrical cabinet	Armoire électrique
5	12020318	1	Targhetta	Data plate	Plaquette frigus
6	12000002	4	Piede	Foot	Pied
7	336067137	4	Guarnizione	O-ring	Joint
8	540501038	2	Distanziale	Spacer	Entretoise



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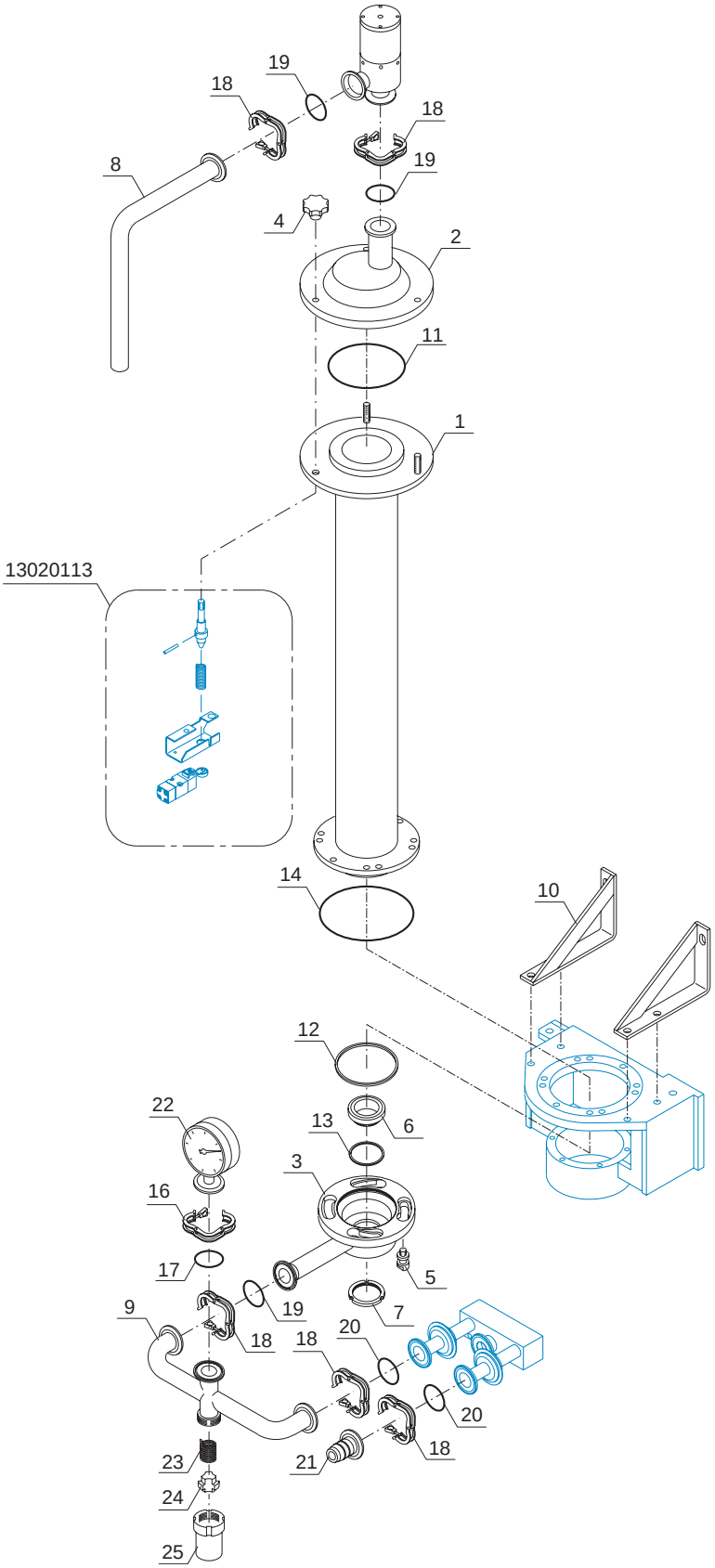
Cilindro congelatore **1/1** **13020349**

Freezer cylinder - Cylindre congélateur

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	12020368	1	Cilindro	Cylinder	Cylindre
2	12020081	1	Coperchio	Cover	Couvercle
3	12020147	1	Culatta	Bottom	Culasse
4	141035120	3	Pomolo	Handgrip	Manople
5	141015458	4	Perno	Pin	Axe
6	12020058	1	Anello	Ring	Anneau
7	141015473	1	Ghiera	Ring nut	Bague
8	141040365	1	Tubo	Hose	Tube
9	12020348	1	Tubo collettore	Hose	Tube
10	12020347	1	Squadra	Bracket	Equerre
11	336067069	1	Guarnizione	O-ring	Joint
12	336067184	1	Guarnizione	O-ring	Joint
13	336067141	1	Guarnizione	O-ring	Joint
14	336067145	1	Guarnizione	O-ring	Joint
16	016060219	1	Chiusura clamp 2"	Clamp lockup	Fermeture clamp
17	018020583	1	Guarnizione 2"	O-ring	Joint
18	016060218	5	Chiusura clamp 1"	Clamp lockup	Fermeture clamp
19	018020581	3	Guarnizione clamp	Clamp gasket with edge	Garniture clamp avec bord
20	018020582	2	Guarnizione clamp	Clamp gasket with edge	Garniture clamp avec bord
21	016960007	1	Portagomma clamp	Hose-holder clamp	Porte-tuyau clamp
22	015075615	1	Manometro	Manometer	Manomètre
23	146000020	1	Molla	Spring	Ressort
24	146000015	1	Tappo	Cap	Bouchon
25	146000010	1	Bicchierino	Cup	Godet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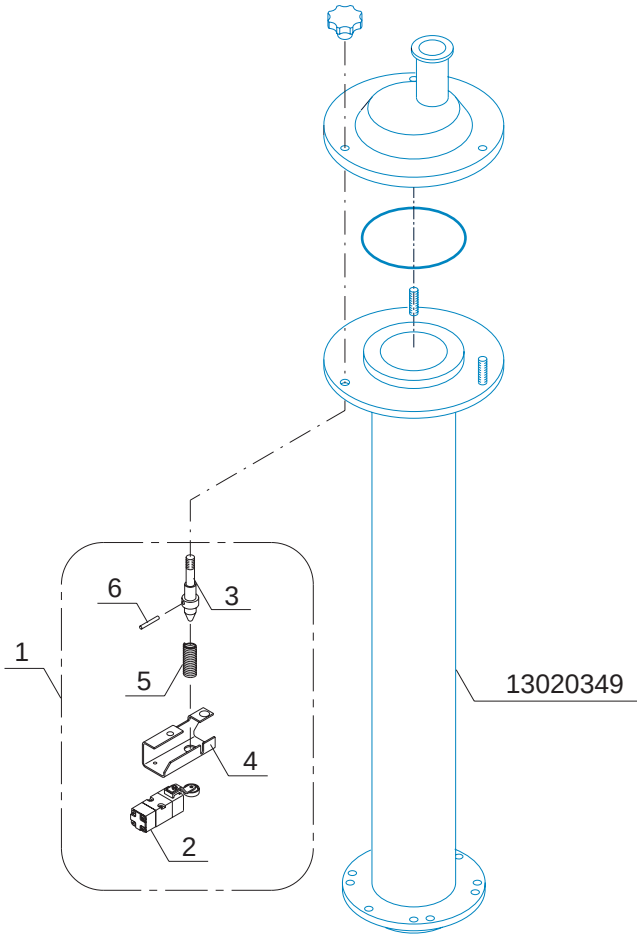
Gruppo micro di sicurezza **1/1** **13020113**

Safety microswitch - Micro de sécurité

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	13020113	1	Micro di sicurezza	Safety microswitch	Micro de sécurité
2	017035938	1	Micro	Microswitch	Micro
3	12020282	1	Vite	Screw	Vis
4	12020283	1	Supporto micro	Micro support	Support micro
5	17020090	1	Molla	Spring	Ressort
6	326024270	1	Spina	Pin	Goupille



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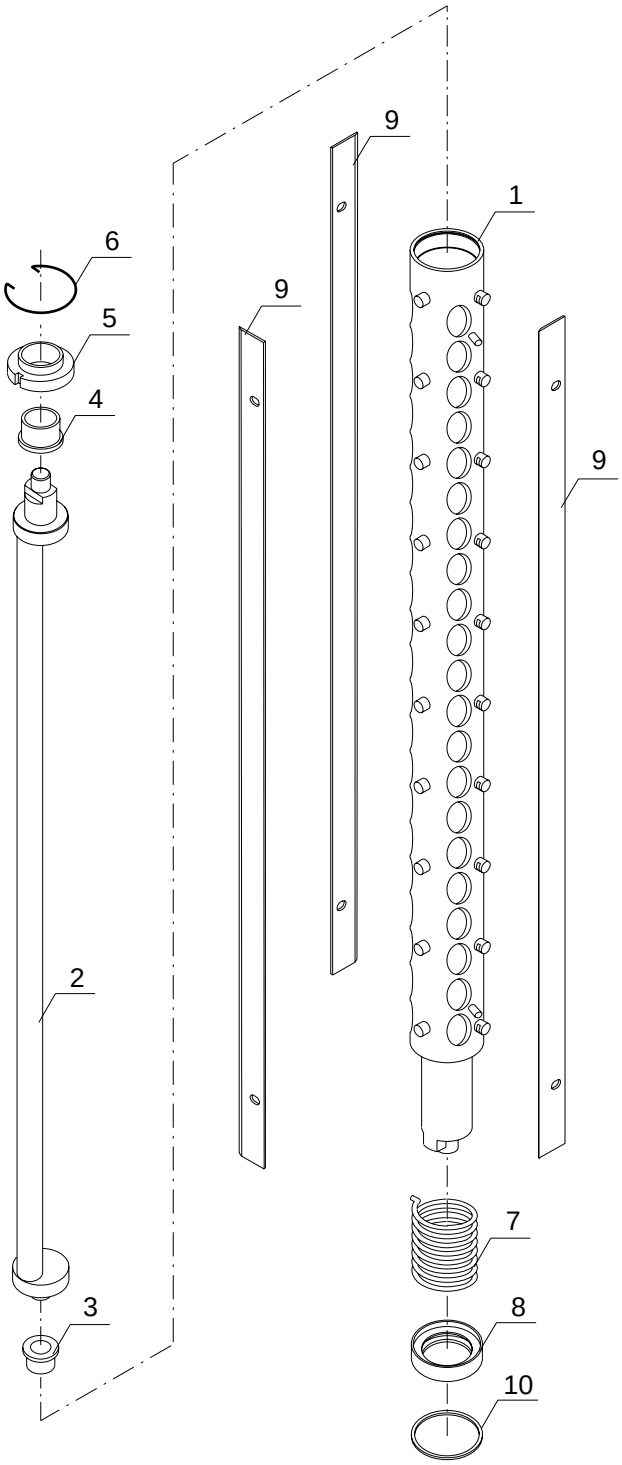
Albero sbattitore **1/1** **13020348**

Dasher unit - Groupe dasher

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	141015477	1	Albero sbattitore	Shaft	Arbre
2	141025220	1	Eccentrico	Eccentric cam	Excentrique
3	12020057	1	Bronzina	Bushing	Douille
4	12020056	1	Bronzina	Bushing	Douille
5	141015446	1	Ghiera	Ring nut	Bague
6	141025250	1	Molla	Spring	Ressort
7	145500029	1	Molla	Spring	Ressort
8	145500026	1	Ghiera	Ring nut	Bague
9	141025215	3	Lama	Blade (*)	Lame (*)
10	336067170	1	Guarnizione OR	Seal	Joint torique OR



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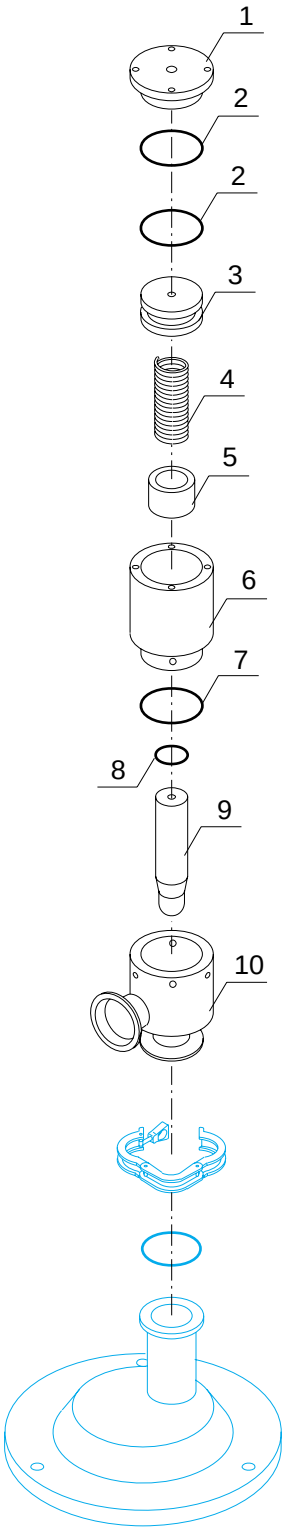
Gruppo uscita miscela **1/1** **13020025**

Mix outlet unit - Groupe sortie mélange

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	12020120	1	Tappo	Cap	Bouchon
2	336067054	2	Guarnizione OR	Seal	Joint torique OR
3	12020119	1	Pistone	Piston	Piston
4	12020121	1	Molla	Spring	Ressort
5	12020123	1	Boccola	Bush	Bague
6	12020122	1	Corpo superiore	Upper body	Corps supérieur
7	336066008	1	Guarnizione OR	Seal	Joint torique OR
8	336067048	1	Guarnizione OR	Seal	Joint torique OR
9	12020100	1	Otturatore	Plug	Obturateur
10	12020101	1	Corpo inferiore	Lower body	Corps inférieur



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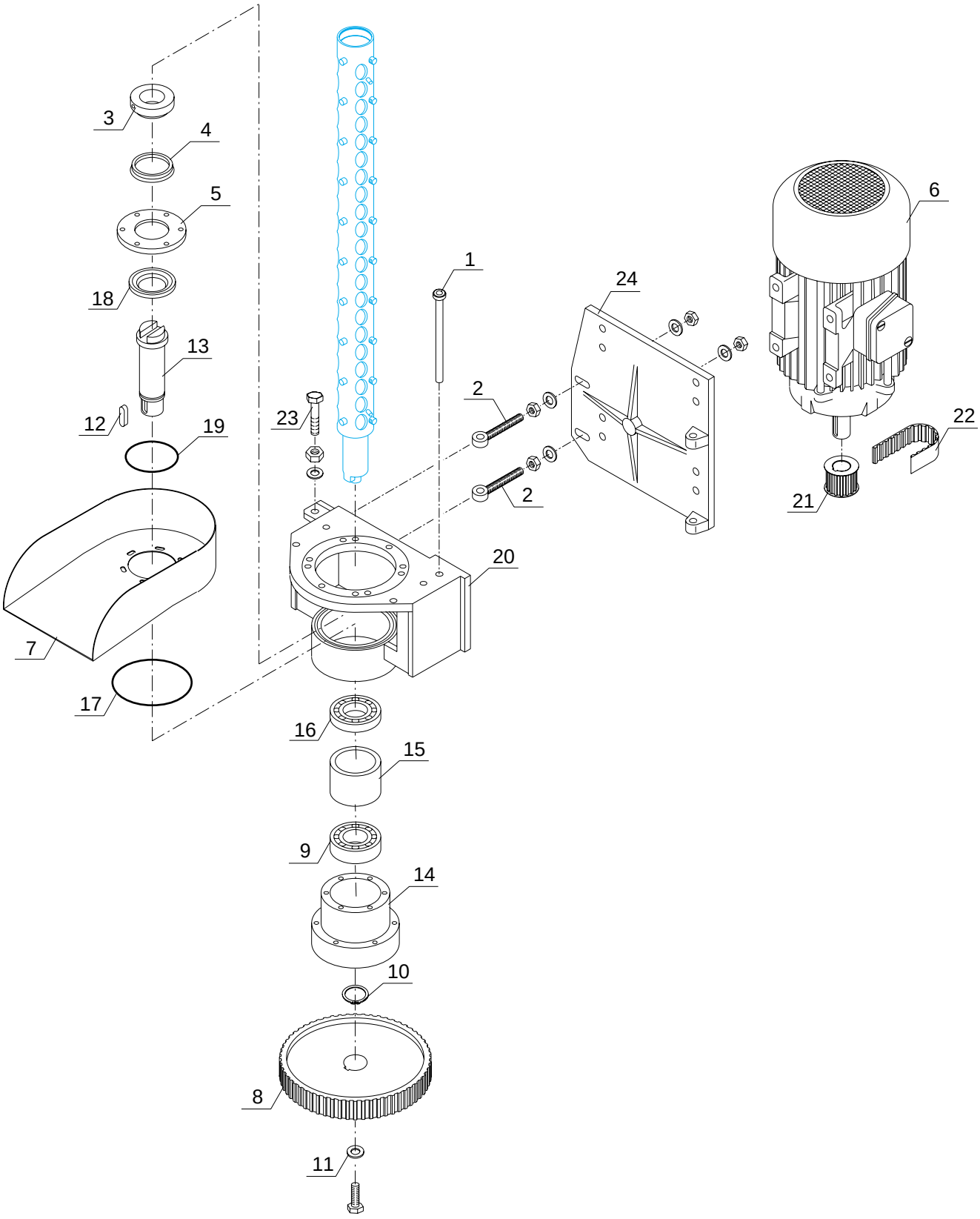
Gruppo trazione **1/1** **13020350**

Drive - Traction

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	13020302	1	Perno	Pin	Axe
2	12020304	2	Tirante	Tie rod	Entretoise
3	141015451	1	Anello	Ring	Anneau
4	336069034	1	Guarnizione	O-ring	Joint
5	12020289	1	Anello	Ring	Anneau
6	014045732	1	Motore	Motor	Moteur
7	12020293	1	Scivolo	Chute	Goulotte
8	12020295	1	Puleggia	Pulley	Poulie
9	17020127	1	Cuscinetto	Bearing	Roulement
10	326019040	1	Seeger	Seeger	Seeger
11	326007051	1	Rondella	Washer	Rondelle
12	326013124	1	Chiavetta	Key	Clavette
13	12020344	1	Albero	Shaft	Arbre
14	12020345	1	Flangia	Flange	Bride
15	12020343	1	Distanziale	Spacer	Entretoise
16	336001720	1	Cuscinetto	Bearing	Roulement
17	17000867	1	Guarnizione OR	Seal	Joint torique OR
18	336071382	1	Corteco seal	Corteco	Corteco
19	336067069	1	Guarnizione	O-ring	Joint
20	12020299	1	Fusione supporto	Support casting	Support coulé
21	12020300	1	Puleggia	Pulley	Poulie
22	17020186	1	Cinghia	Belt	Courroie
23	12020303	2	Perno	Pin	Axe
24	12020342	1	Piastra supporto	Support plate	Jumelle



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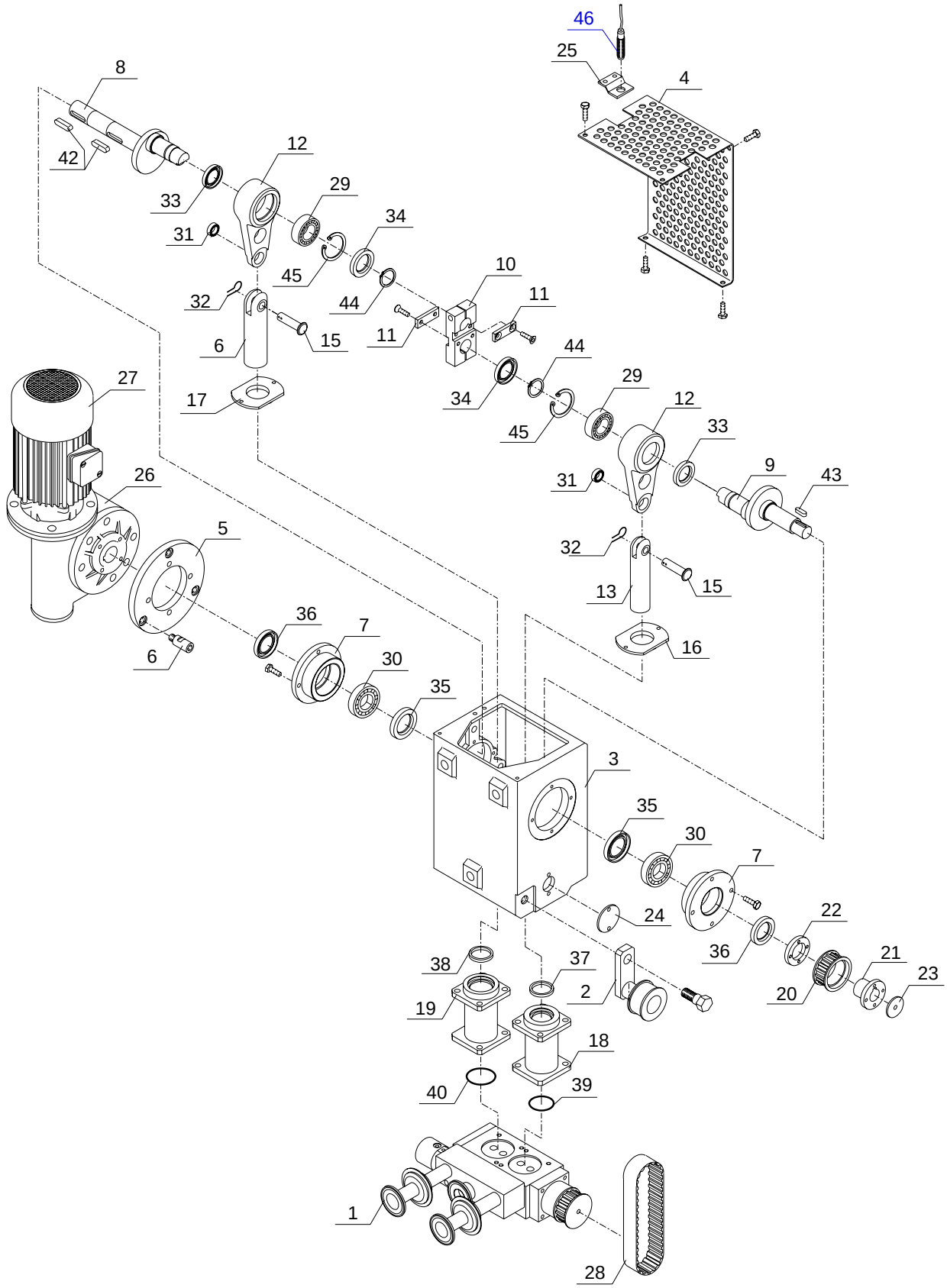
Pompa a 2 stadi **1/1** **13020366**

Pump - Pompe

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	13020362	1	Gruppo distributore		
2	13020363	1	Rotella tendicinghia		
3	12020353	1	Corpo supporto pompa	Supporting body	Support pompe
4	12020241	1	Protezione	Protection	Protection
5	12020209	1	Flangia	Flange	Bride
6	12020354	1	Distanziale	Spacer	Entretoise
7	12020355	2	Flangia	Flange	Bride
8	12020356	1	Albero a gomito	Shaft	Arbre
9	12020357	1	Albero a gomito	Shaft	Arbre
10	12020214	1	Piastra	Plate	Plaque
11	12020215	1	Chiavetta	Key	Clavette
12	12020275	1	Biella	Connecting rod	Bielle
13	12020379	1	Pistone	Piston	Piston
14	12020380	1	Pistone	Piston	Piston
15	12020381	2	Spinotto	Piston pin	Branche
16	12020227	1	Flangia	Flange	Bride
17	12020228	1	Flangia	Flange	Bride
18	12020223	1	Cilindro	Cylinder	Cylindre
19	12020224	1	Cilindro	Cylinder	Cylindre
20	12020375	1	Puleggia	Pulley	Poulie
21	12020376	1	Flangia	Flange	Bride
22	12020377	1	Anello bloccaggio	Ring	Anneau
23	12020365	1	Rondella	Washer	Rondelle
24	12020245	1	Piattello di chiusura	Plate	Plateau
25	12020278	1	Piastrina	Plate	Plaquette
26	17020231	1	Riduttore	Reduction gear	Réducteur
27	17020234	1	Motore	Motor	Moteur
28	17020233	1	Cinghia dentata	Belt	Courroie
29	336002405	2	Cuscinetto	Bearing	Roulement
30	336009906	2	Cuscinetto	Bearing	Roulement
31	17020080	2	Cuscinetto	Bearing	Roulement
32	326019656	2	Coppiglia		
33	17020076	2	Anello	Ring	Anneau
34	336071235	2	Corteco	Corteco seal	Corteco
35	17000739	2	Anello	Ring	Anneau
36	336071190	2	Anello	Ring	Anneau
37	336067533	1	Guarnizione	O-ring	Joint
38	336067534	1	Guarnizione	O-ring	Joint
39	336067088	1	Guarnizione	O-ring	Joint
40	336067092	1	Guarnizione	O-ring	Joint
42	326013105	2	Chiavetta	Key	Clavette
43	326013075	1	Chiavetta	Key	Clavette
44	326019025	2	Seeger	Seeger	Seeger
45	326019152	2	Seeger	Seeger	Seeger
46	017035929	1	Proximity	Proximity sensor	Capteur de proximité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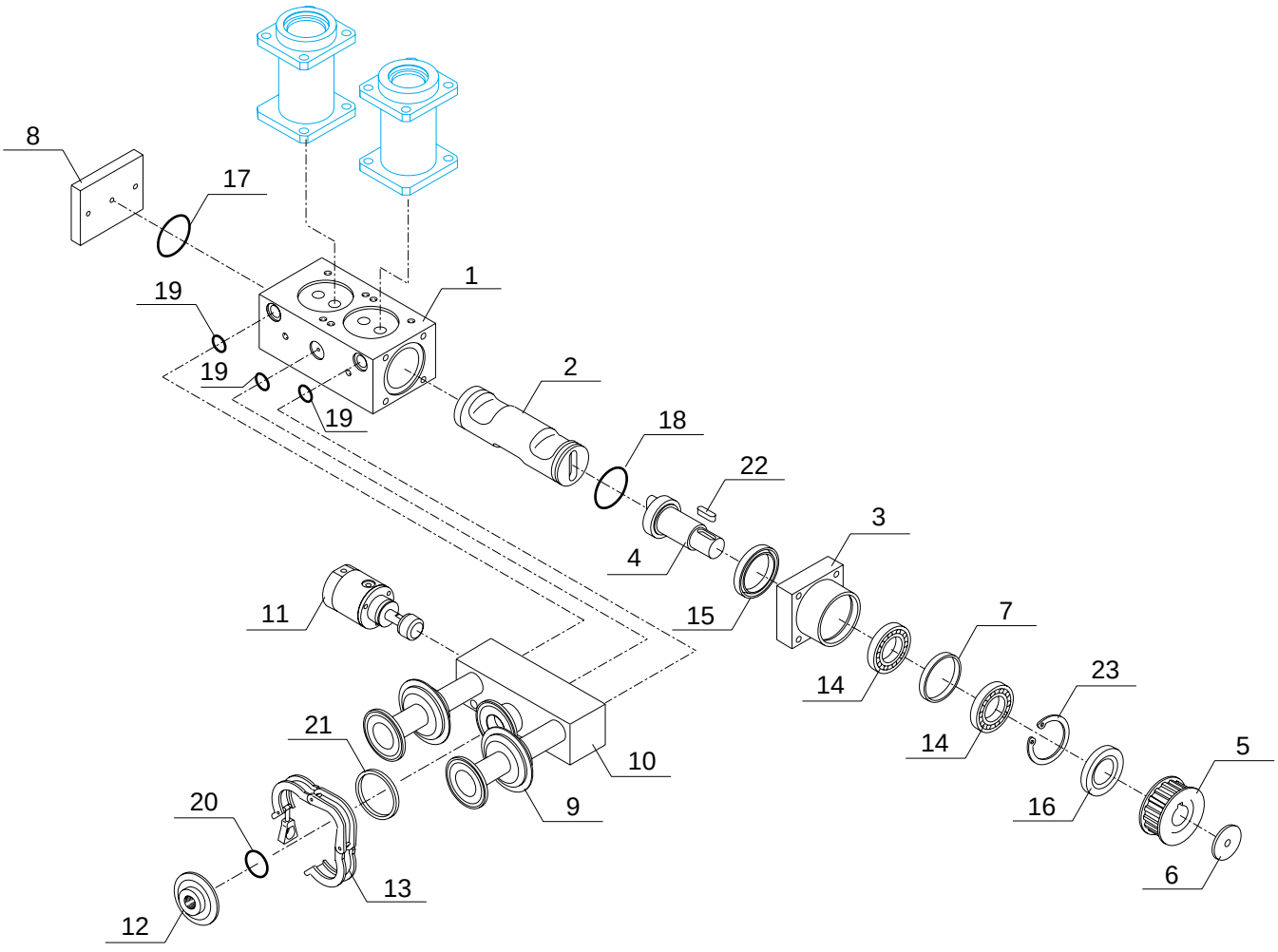
1/1 - 13020366

Gruppo distributori **1/1** **13020362**

Distributors - Distributeurs

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	12020358	1	Corpo distributore	Dispenser body	Corps distributeur
2	12020359	1	Distributore	Distributor	Distributeur
3	12020360	1	Flangia	Flange	Bride
4	12020361	1	Albero	Shaft	Arbre
5	12020363	1	Puleggia	Pulley	Poulie
6	12020365	1	Rondella	Washer	Rondelle
7	12020366	1	Distanziale	Spacer	Entretoise
8	12020378	1	Piatto	Plate	Plateau
9	12020240	2	Chiusura	Closing system	Fermeture
10	12020238	1	Blocchetto	Block	Bloc
11	13020105	1	Cilindro	Cylinder	Cylindre
12	GM50E54001	1	Valvola di non ritorno	Check valve	Soupape de tenue
13	016060218	1	Chiusura clamp 1"	Clamp lockup	Fermeture clamp
14	336001443	2	Cuscinetto	Bearing	Roulement
15	17000735	1	Anello	Ring	Anneau
16	17000736	1	Anello	Ring	Anneau
17	336067088	1	Guarnizione	O-ring	Joint
18	336067092	1	Guarnizione	O-ring	Joint
19	336067045	3	Guarnizione	O-ring	Joint
20	336067532	1	Guarnizione	O-ring	Joint
21	018020581	1	Guarnizione clamp	Clamp gasket with edge	Garniture clamp avec bord
22	326013075	1	Chiavetta	Key	Clavette
23	326019147	1	Anello elastico	Seeger	Anneau élastique

13020362

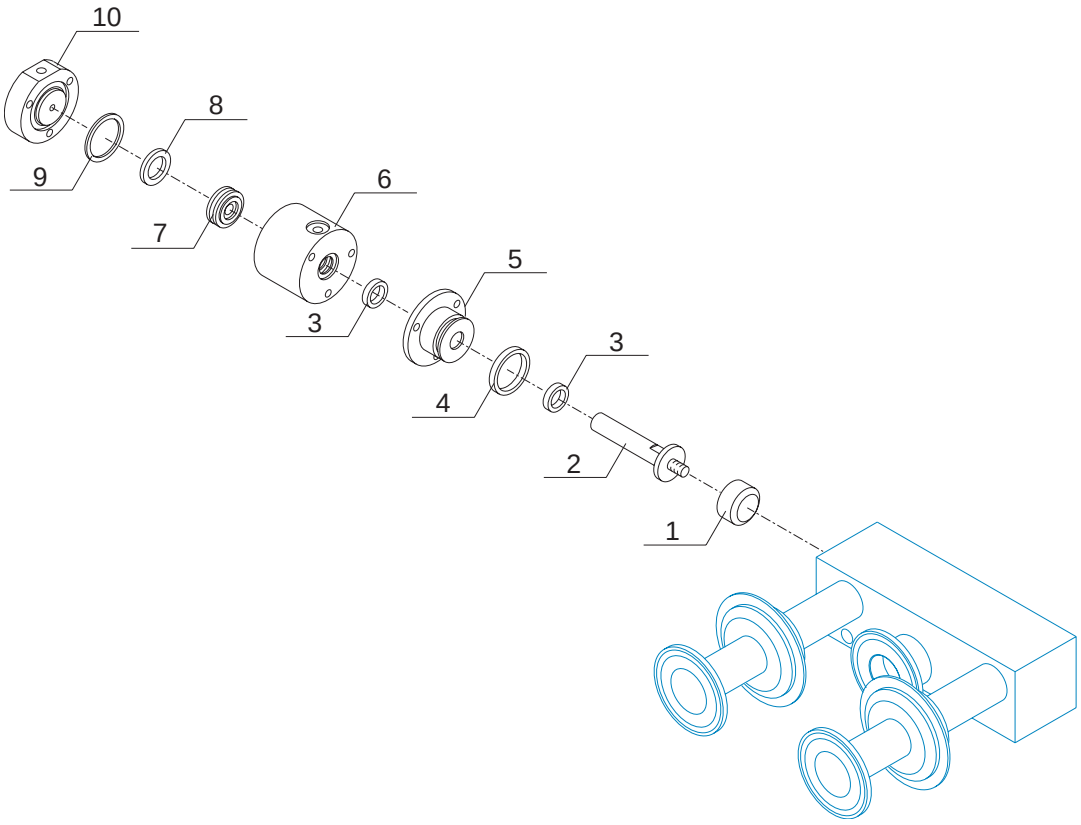


1/1 - 13020362

Cilindro By-pass **1/1** **13020105**

Bypass cylinder - Cylindre by-pass

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	12020242	1	Tampone di chiusura	Buffer	Tampon
2	12020243	1	Stelo cilindro	Cylinder stem	Tige cylindrique
3	336067030	2	Guarnizione OR	Seal	Joint torique OR
4	336067042	1	Guarnizione	O-ring	Joint
5	12020203	1	Testata anteriore cilindro	Front cylinder head	Culasse avant cylindre
6	12020204	1	Cilindro pompa	Pump cylinder	Cylindre
7	12020244	1	Pistone	Piston	Piston
8	17020064	1	Guarnizione OR	Seal	Joint torique OR
9	336067020	1	Guarnizione	O-ring	Joint
10	12020202	1	Testata posteriore cilindro	Rear cylinder head	Culasse arrière cylindre
11	326002236	1	Vite	Screw	Vis

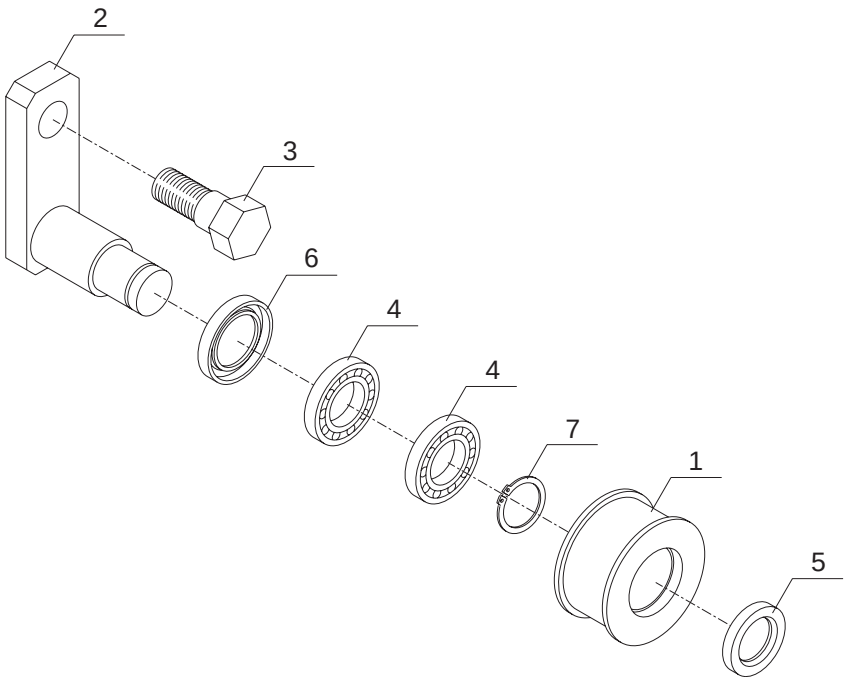


1/1 - 13020105

Rotella tendicinghia **1/1** **13020363**

Weel tightener - Roue de tendeur

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	12020364	1	Rotella	Wheel	Roue
2	12020362	1	Leva	Lever	Levier
3	12020206	1	Vite per tendicatena	Screw	Vis
4	17000743	2	Cuscinetto	Bearing	Roulement
5	17000742	1	Corteco	Corteco seal	Corteco
6	17000741	1	Corteco	Corteco seal	Corteco
7	326019015	1	Seeger	Seeger	Seeger

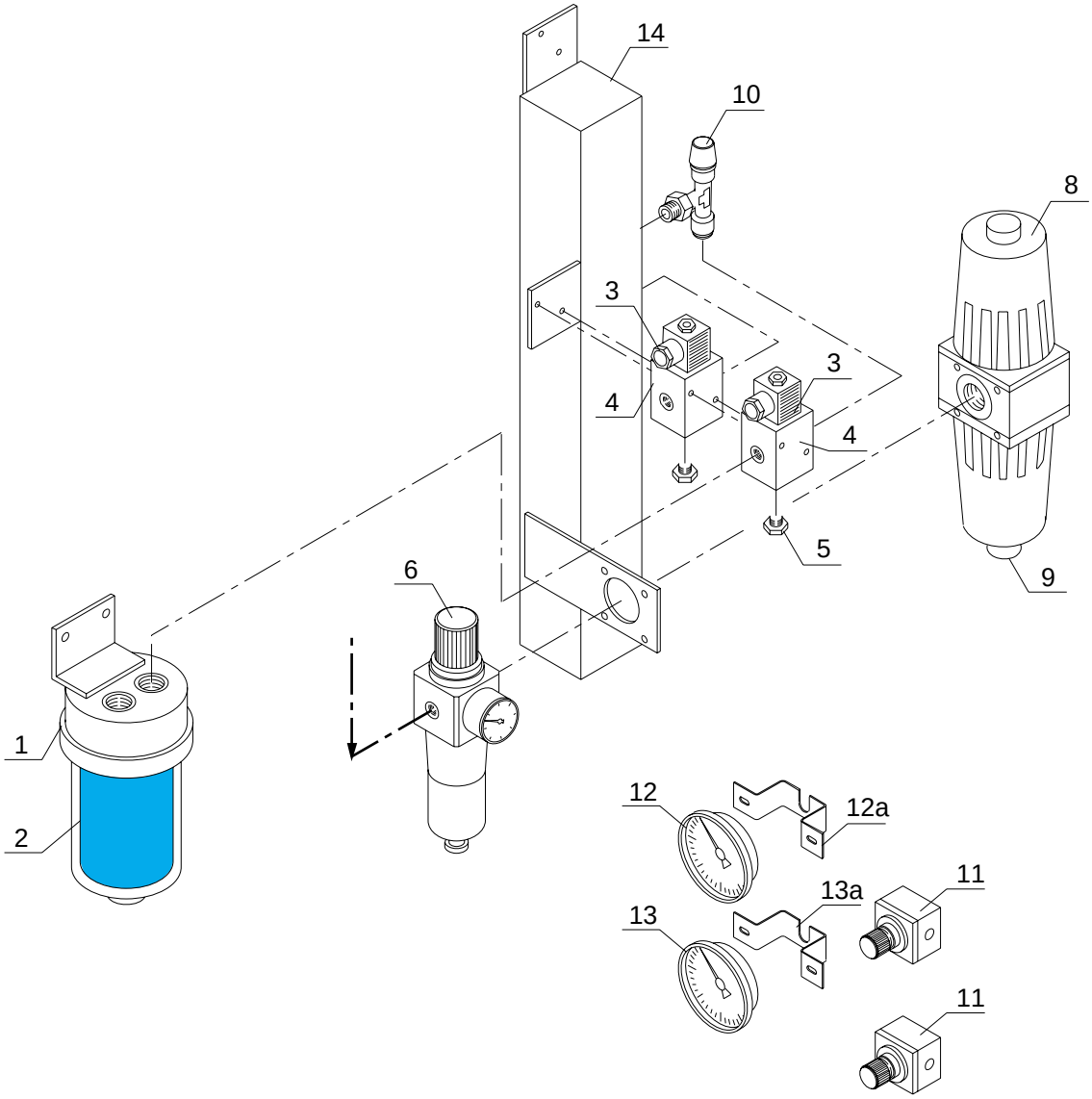


1/1 - 13020363

Impianto pneumatico **1/1** **13020096**

Pneumatic plant - Installation pneumatique

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	12020080	1	Filtro	Filter	Filtre
2	333012027	1	Cartuccia aria alimentare	Cartridge	Cartouche
3	17000092	2	Connettore	Connector	Connecteur
4	17000087	2	Valvola	Valve	Vanne
5	17000095	2	Tappo	Cap	Bouchon
6	17000233	1	Gruppo riduttore	Reducer group	Réducteur
7	333012022	1	Filtro alta efficienza	High-performance filter	Filtre
8	333012025	1	Cartuccia olio	Oil cartridge	Cartouche
9	333012026	1	Cartuccia carboni attivi	Cartridge	Cartouche
10	17000207	1	Pressostato	Pressure switch	Pressostat
11	17000168	2	Riduttore	Reduction gear	Réducteur
12	015975050	1	Manometro	Manometer	Manomètre
13	015975051	1	Manometro	Manometer	Manomètre
14	12020145	1	Supporto	Support	Support
12a	015975052	1	Squadretta	Bracket	Equerre
13a	015975052	1	Squadretta	Bracket	Equerre

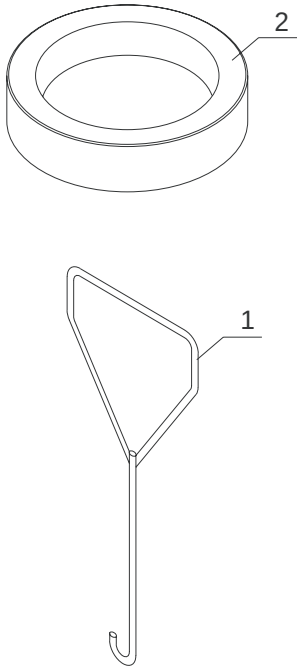


1/1 - 13020096

Attrezzi dotazione standard **1/1** **13020117**

Standard equipment - Equipement standard

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	12020124	1	Attrezzo estrazione albero	Shaft removal tool	Equipement extraction arbre
2	12020106	1	Ghiera invito albero	Shaft raiser ring nut	Bague invitation arbre



1/1 - 13020117

F 53-T Multifunctional digital device.

(Revolution counter + thermostat, Ammeter + hot gas regulator, Pressure gauge)

Configurable in the following modes:

- ***CG**: Revolution counter – impulse/minute counter – litre/hour counter – input temperature thermostat.*
- ***GM**: Ammeter with 2 programmable thresholds (gas and comp), hot gas control, defrosting.*
- ***BAR:** Pressure gauge with 2 programmable thresholds.*

General features

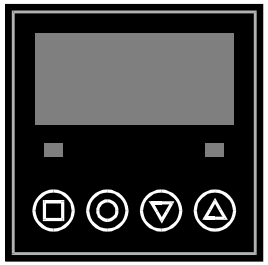
Display	: 3 green displays, 1 red LED, 1 green LED.
Outputs	: 2 24 V AC 4 A UNPROTECTED with static relays for hot gas and compressor enabling
Proximity sensor input (Px)	: for NPN proximity sensor, supplied at 15 DC
Pressure input (Pr)	: for 16 bar fs 4 – 20 mA self-powered sensor
Amp. input	: for current transformer with 500 turns
Temperature input	: for Pt 100 (2 wires)
Power supply	: 16 – 28 V AC (19 – 40 V DC) – max. 0.5 A
Dimensions	: 49 x 48 x 140 mm
Degree of protection	: IP 65 (frontal)

CG: Revolution counter
- Operates on the principle of measuring mean period and subsequently converting it to frequency using the selected ratio.
- Display updated every second.
- Minimum sampling time (period accumulation) 1 second.
- Digitally set temperature threshold protects pump.
- When temperature threshold is exceeded, the "comp" outlet opens and the "gas" outlet closes.
- Green LED indicates "comp" outlet on (= temperature < 68ºC)
- Red LED for proximity sensor signal monitor

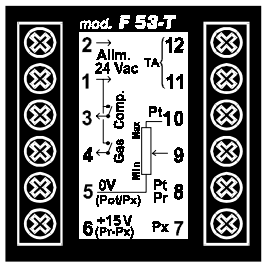
GM: Ammeter
- Indicates absorption from 1.0 to 50.0 A with a resolution of 0.2 A.
- Digitally set threshold triggers intervention of hot gas at 2.0 to 50.0 A.
- Digitally set threshold turns off compressor at 2.0 to 50.0 A.
- Hot gas is turned on and the compressor stopped when the thresholds are exceeded.
- Timing from 0% to 100% for hot gas solenoid valve, with 6 second period and control by external potentiometer.
- Automatic activation of hot gas with defrosting function when appliance is switched on and whenever the dasher stops; the function can be timed to run from 5 to 30 seconds.
- 3 second delay in restarting the compressor when it is stopped due to over-absorption.
- Green LED: compressor-enabling monitor.
- Red LED: hot gas-enabling monitor.
- Blinking display: indicates that the threshold for turning on hot gas has been exceeded.

BAR: Pressure gauge
- Displays cylinder outlet pressure between 0 and 16 bar, resolution 0.1 bar.
- 2 digitally set alarm thresholds.
- "Gas" outlet turned on when first threshold is exceeded.
- "Comp" outlet is turned off when second threshold is exceeded.
- Green LED: "comp" outlet monitor.
- Red LED: "gas" outlet monitor.
- Flashing display: at least one threshold has been exceeded.

Front view



Rear view and electrical connections



Programming

- To access the programming mode, keep the ☐ button pressed until the message ***PrG*** appears (10 seconds – or 2 seconds if the button is held down before the power to the device is switched on).
- Release the ☐ button.
- To select a function, press ☐ and release, then press Δ or ∇.
- Hold down O to display parameter name.
- Release O to display parameter value.
- To select a parameter, hold down O and press Δ or ∇.
- To set the selected parameter, release O and press Δ or ∇.

IMPORTANT: When finished programming, press ☐ and O at the same time to store data in memory and return to operating mode.

Functions and parameters

Function	Parameter	Values	Description
CG	***cnt.***	1…5	1 = ratio 1:1 (CG1); 2 = ratio 1:10.33 (CG10); 3 = ratio 1:15 (CG15); 4 = l/h (1 imp. = 0.0282 l); 5 = l/h (1 imp. = 0.0577 l)
	ºC	50…90	Threshold for turning off refrigerator compressor.
GM	***GAS***	2.0…50.0	Threshold for turning on hot gas (amperes).
	CMP	2.0…50.0	Threshold for turning off refrigerator compressor.
	dEF	5…30	Duration of defrosting (seconds).
	A		Calibration of ammeter **(must first be enabled)**
bAr	***oFS***		Calibration and resetting of pressure sensor.
	SPn		Calibration of pressure sensor gain.
	Pr1		Threshold 1 – enables "gas" outlet.
	Pr2		Threshold 2 – disables "compressor" outlet.
ISt	***Pot***		Reads potentiometer input (0 – 30) for diagnostic purposes.
	ºC		Reads temperature input for diagnostic purposes.

Press Δ or ∇ for more than 1 second to go from slow to rapid repetition.
Press Δ and ∇ together for more than 1 second to set the default value.

Connect terminals 5 and 7 with a jumper to permit control of ammeter readings.
If settings are stored in memory when the device is in ***ISt*** mode, it will return to programming mode again.

Further information

Hi : Reading exceeds permitted limit (for instance, short circuit in pressure sensor).
Lo : Reading falls below permitted minimum limit (for instance, no pressure to sensor).

Tetra Pak
Hoyer S.p.A.

MACHINE.....: FRIGUS 400M 400V, 50/60 Hz

CUSTUMER.....: .

ORDER.....: .

N° DRAW.....: 13020368 Rev.01 del 09/01/03

DESIGNED.....: CEP M.D.

CHECK.....:.

DATE.....: 09 GEN 2003

SCALE.....: //

SPECIFICATION

GENERAL SPECIFICATION

BOX.....: INOX
CARRY OUT.....: IP55
DIMENSIO.....: LAYOUT
TYPE/DATA.....: HOY.12020094 GENERAL CABINET - 12020018/1

POWER SUPPLY SPECIFICATION

MAIN
POWER SUPPLY

VOLTAGE.....: 380V
FREQUENCY.....: 50Hz
POWER.....: 15.5KW 36A

CABLE SUPPLY SPECIFICATION

MAIN
CABLE

CABLE 4 X 25 mmq

GROUND CABLE
SECTION (MIN.) .....: /

MAIN SWITCH

VOLTAGE.....: 380V
CURRENT.....: 80A
CIRCUIT BREAKER.....: /
TYPE/DATA.....: VC4

WIRE COLOR

CONNECTION TO:	VOLTAGE:	COLOR:
AC MOTOR	380V 50Hz	black
AC CONTROL CIRCUIT	220V 50Hz	red
AC CONTROL CIRCUIT	24V 50Hz	red
DC CONTROL CIRCUIT	24VDC	blue
IN TENSION ALSO WITH MAIN SWITCH OPENED	---	orange
NEUTRAL	---	blue
GROUND	---	yellow/green

LIGHT COLOR

FUNCTION:	COLOR:
MOTOR RUNNING	green
ALARM,FOULT,WARNING,ETC.	red
CYCLE END,ABILITATION	yellow
OTHER	blue

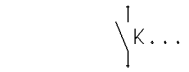
PUSHBUTTON COLOR

FUNCTION:	COLOR:
START	green
STOP	red
EMERGENCY STOP	mushroomhead red
SELECTION,RESET	yellow
TEST	blue
OTHER	black

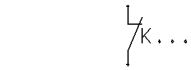
Tetra Pak
Hoyer S.p.A.

MACCHINA : FRIGUS 400M 400V, 50/60 Hz
CLIENTE : .
ORDINE : .
DISEGNO N.:13020368 Rev.01 del 09/01/03
DISEGNATO: CEP MD
VISTO:
DATA : 09 GEN 2003
SCALA : //

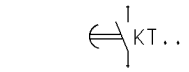
FOGLIO 2
SEGUE 3



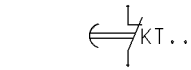
Instantaneous NO contact



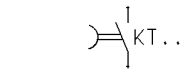
Instantaneous NC contact



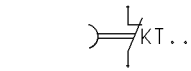
Time delayed NO contact - on delay



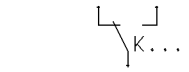
Time delayed NC contact - on delay



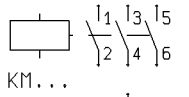
Time delayed NO contact - off delay



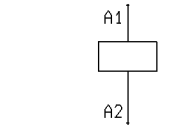
Time delayed NC contact - off delay



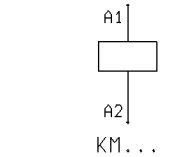
Instantaneous change-over contact



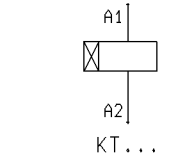
Main contacts of contactor



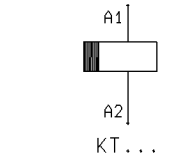
Aux. control relay coil



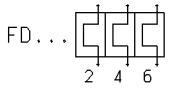
Min contactor coil



On delay timer coil

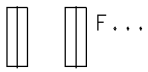


Off delay timer coil

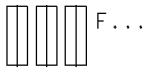


Thermal overload relay

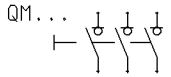
One pole fuse



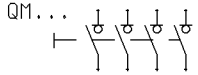
Two pole fuse



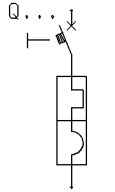
Three pole fuse



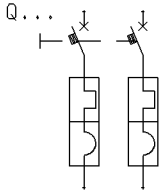
Three pole mains disconnect switch



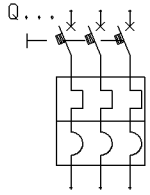
Four pole mains disconnect switch



One pole circuit breaker

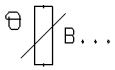


Two pole circuit breaker

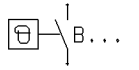


Three pole circuit breaker

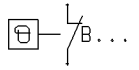
Resistor



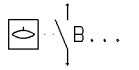
Thermistor



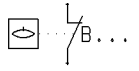
Temperature switch



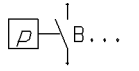
Temperature switch



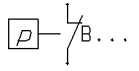
Float switch no contact



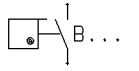
Float switch nc contact



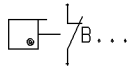
Pressure switch no contact



Pressure switch nc contact



Flow switch no contact



Flow switch nc contact

NO limit switch

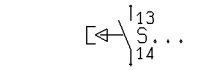
NC limit switch

Tetra Pak
Hoyer S.p.A.

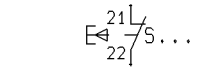
MACCHINA : FRIGUS 400M 400V, 50/60 Hz			FOGLIO 3
CLIENTE : .			
ORDINE : .	DISEGNO N.:13020368 Rev.01 del 09/01/03		SEGUE 4
DISEGNATO: CEP MD	VISTO:	DATA : 09 GEN 2003 SCALA : //	

NO proximity switch

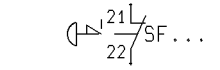
NC proximity switch



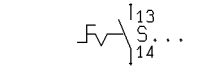
One pole NO push button



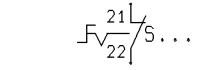
One pole NC push button



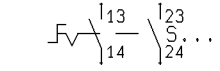
Emergency stop mushroom head push button



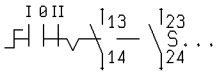
One pole NO selector switch



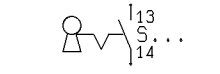
One pole NC selector switch



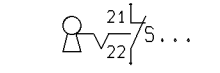
Two pole NO selector switch



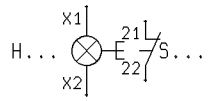
Three position selector switch



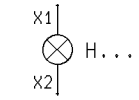
One pole NO selector switch - key operate



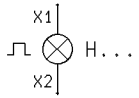
One pole NC selector switch - key operate



Light pushbutton



Pilot light

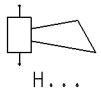


Flashing light

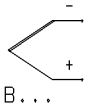
Siren

Alarm buzzer

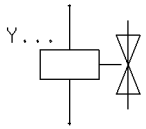
Alarm bell



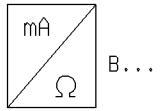
Alarm or annunciator horn



Thermocouple



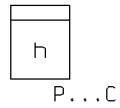
Solenoid valve



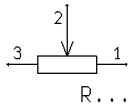
Ω/mA TRASDUCER

Ampmeter

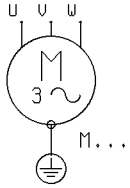
Voltmeter



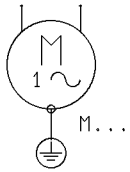
Hours counter



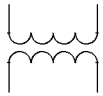
POTENTIOMETER



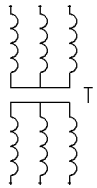
Three phase AC motor



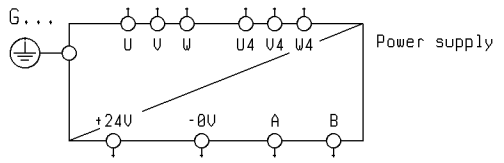
Single-phase AC motor



Single phase transformer



Three phase transformer (star-star connection)



Power supply

Diode

LED

Ground

Connector (plug and receptacle)

Terminals

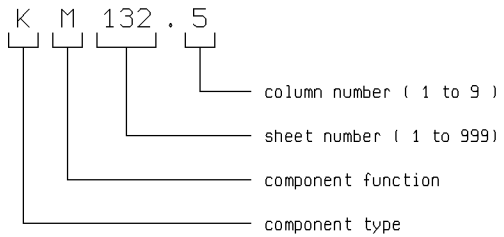
Tetra Pak
Hoyer S.p.A.

MACCHINA : FRIGUS 400M 400V, 50/60 Hz				FOGLIO 4
CLIENTE : .				
ORDINE : .	DISEGNO N.:13020368 Rev.01 del 09/01/03			SEGUE 5
DISEGNATO: CEP MD	VISTO:	DATA : 09 GEN 2003	SCALA : //	

REFERENCE LETTERS FOR DEVICES

COMPONENT TYPE (DIN 40719.2)		COMPONENT FUNCTION	
A....	complex devices	....A	stop or auxiliary function
B....	not electrical transducers	....B	movement
C....	capacitors	C	counter
D....	logic elements	....D	differentiation
E....	components not in this list	....E	start
F....	protections (e.g. fuses)	....F	protection
G....	power supplies , converters	....G	test
H....	signaling elements	....H	indication
K....	contactors and relays	I	integration
L....	inductors	....K	inching duty
M....	motors	L	conductor mark
N....	amplifiers , electronic regulators	....M	main
P....	measuring instruments	....N	measure
Q....	circuit breakers ,disconnect switches	....P	proportional
R....	resistors and potentiometers	....Q	status sensor
S....	operating devices (e.g. pushbuttons)	....R	reset
T....	transformers	....S	recording
U....	electrical transducers	....T	timing delay operation
V....	rectifiers	....U	speed
W....	cables	....W	addition
X....	terminals , connectors	X	multiplication
Y....	electromechanical device (e.g. solenoid valves)	....Y	analog
Z....	arc suppressors	....Z	digital

Each component is designed with a number and
reference letters .
The number indicates where
this component is placed in this way :



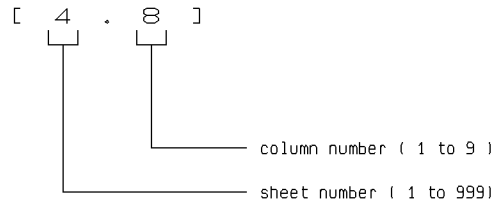
If in the same column of the same sheet there are
a lot of components having the same reference letters,
a number must be placed at the right end for discrimination .

K M 1 3 2 . 5

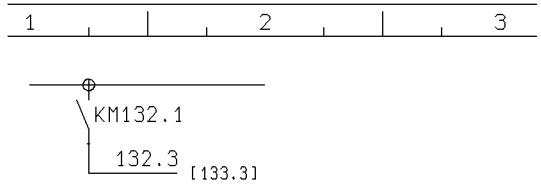
K M 1 3 2 . 5 / 1

REFERENCE ACROSS THE SHEETS

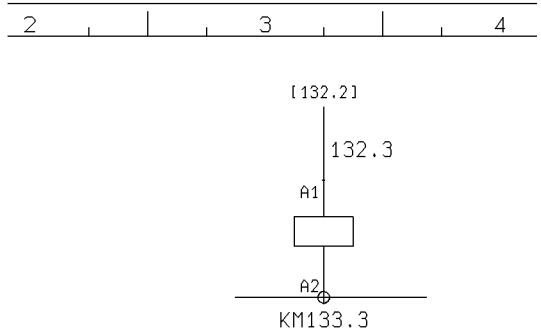
In order to easily find connections or components
drawn part on one sheet and part on others,
near a connection end or near a component ,
are placed a couple of numbers enclosed in square brakets
that indicate wehre you can find the other part
of connection or component.



EXAMPLE : sheet nr. 6



The connection shown goes to sheet 7 column 3
at sheet 7 we have :



Tetra Pak
Hoyer S.p.A.

MACCHINA : FRIGUS 400M 400V, 50/60 Hz			FOGLIO 5
CLIENTE : .			
ORDINE : .	DISEGNO N.:13020368 Rev.01 del 09/01/03		SEGUE 6
DISEGNATO: CEP MD	VISTO:	DATA : 09 GEN 2003	SCALA : //

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

PAG	DESCRIZIONE
1	INTESTAZIONE
2	LEGENDA
3	SIMBOLI ELETTRICI
4	SIMBOLI ELETTRICI
5	NOTE PER LA LETTURA DELLO SCHEMA
6	INDICE PAGINE
10	CIRCUITO DI POTENZA
11	CIRCUITO DI POTENZA
12	ALIMENTAZIONE AUSILIARI
13	CIRCUITO AUSILIARIO 220V AC
15	CIRCUITO AUSILIARIO 24V AC
16	INDICATORI DIGITALI
17	POMPA E ALBERO
18	COMPRESSORE
19	INSERIMENTO ARIA E COMANDO CIP
20	DISPOSITIVI DI SICUREZZA
25	MORSETTIERA
26	MORSETTIERA
27	SCHEMA TOPOGRAFICO QUADRO
28	SCHEMA TOPOGRAFICO PANNELLO COMANDI
29	DISTINTA MATERIALE
30	DISTINTA MATERIALE

PAG	DESCRIZIONE
1	HEADER
2	LEGEND
3	LIST OF ELECRICAL SYMBOLS
4	LIST OF ELECRICAL SYMBOLS
5	NOTES TO READ THE ELECTRIC DIAGRAM
6	INDEX
10	POWER CIRCUIT
11	POWER CIRCUIT
12	AUXILIARY POWER SUPPLY
13	220V AC AUXILIARY CIRCUIT
15	24V AC AUXILIARY CIRCUIT
16	DIGITAL DISPLAY
17	PUMP AND DASHER
18	COMPRESSOR
19	OVERRUN AND C.I.P. CONTROL
20	SAFETY DEVICES
25	TERMINAL BOARD
26	TERMINAL BOARD
27	CABINET LAYOUT
28	CONTROL PANEL LAYOUT
29	COMPONENT LIST
30	COMPONENT LIST

Tetra Pak
Hoyer S.p.A.

MACCHINA : FRIGUS 400M 400V, 50/60 Hz

CLIENTE : .

ORDINE : .

DISEGNO N.:13020368 Rev.01 del 09/01/03

DISEGNATO: CEP MD

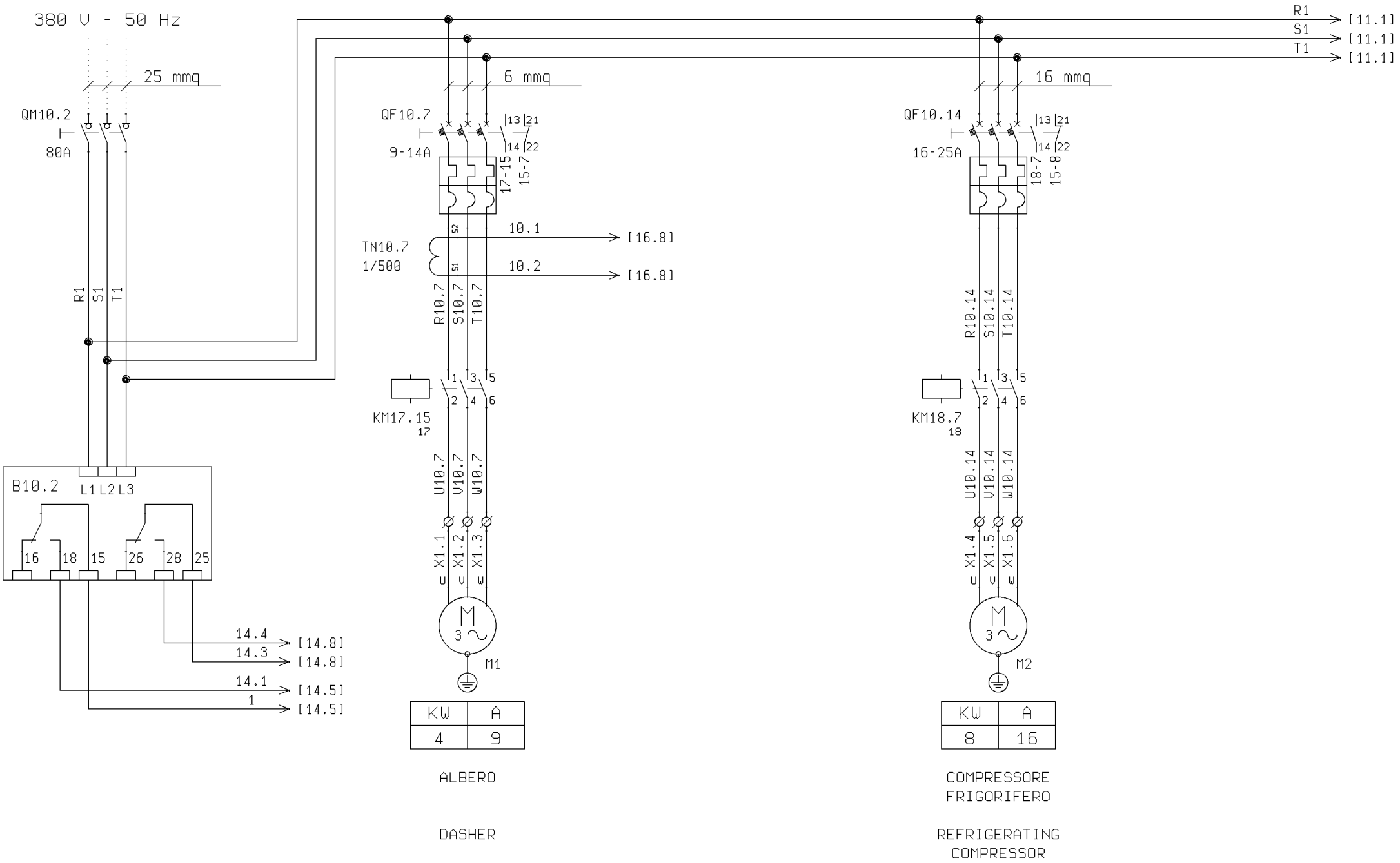
VISTO:

DATA : 09 GEN 2003

SCALA : //

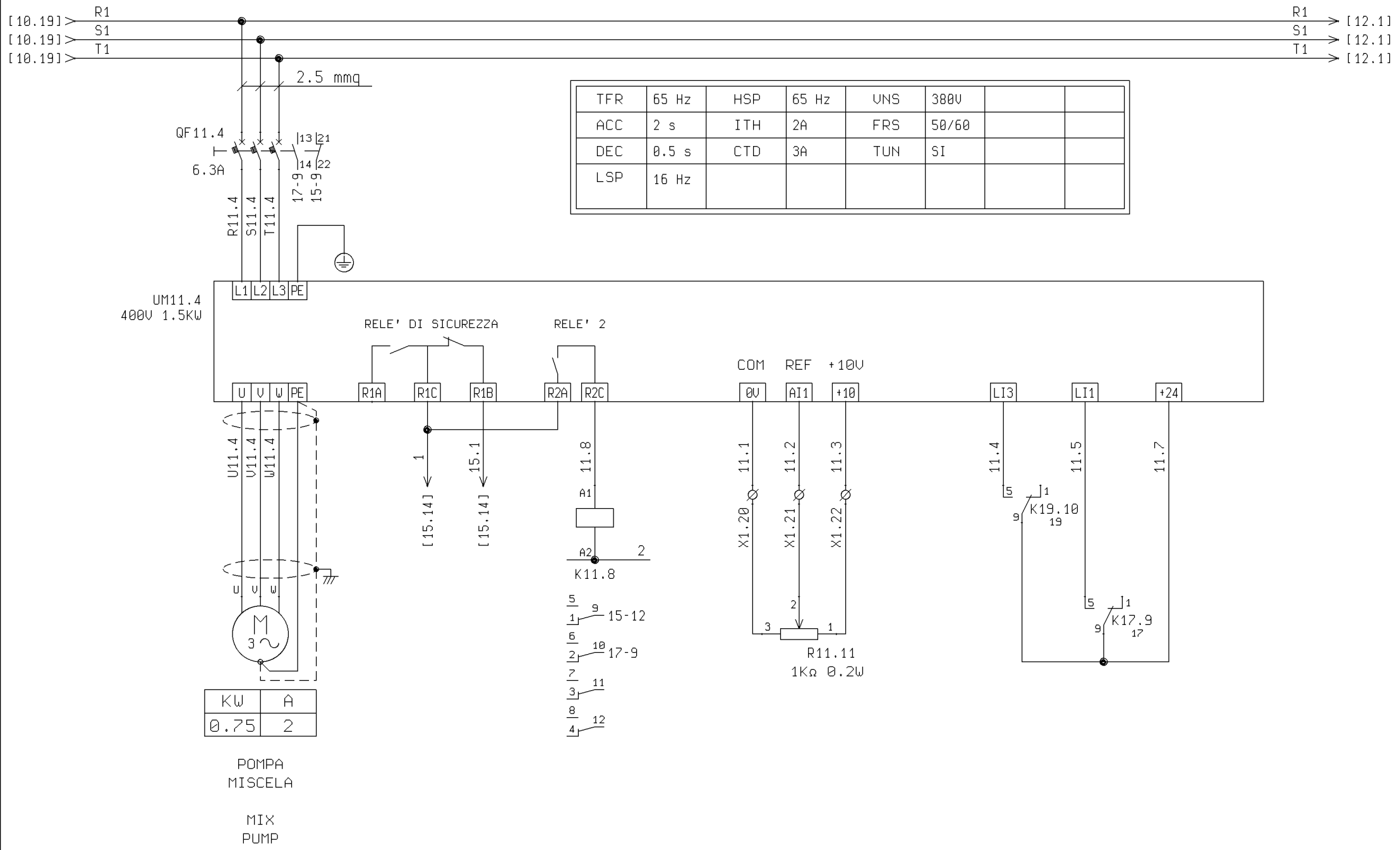
FOGLIO 6

SEGUE 10



Tetra Pak
Hoyer S.p.A.

MACCHINA : FRIGUS 400M 400V, 50/60 Hz			FOGLIO 10
CLIENTE : .			
ORDINE : .	DISEGNO N.:13020368 Rev.01 del 09/01/03		SEGUE 11
DISEGNATO: CEP MD	VISTO:	DATA : 09 GEN 2003 SCALA : //	



TFR	65 Hz	HSP	65 Hz	VNS	380V		
ACC	2 s	ITH	2A	FRS	50/60		
DEC	0.5 s	CTD	3A	TUN	SI		
LSP	16 Hz						

KW	A
0.75	2

POMPA
MISCELA

MIX
PUMP

Tetra Pak
Hoyer S.p.A.

MACCHINA : FRIGUS 400M 400V, 50/60 Hz

CLIENTE : .

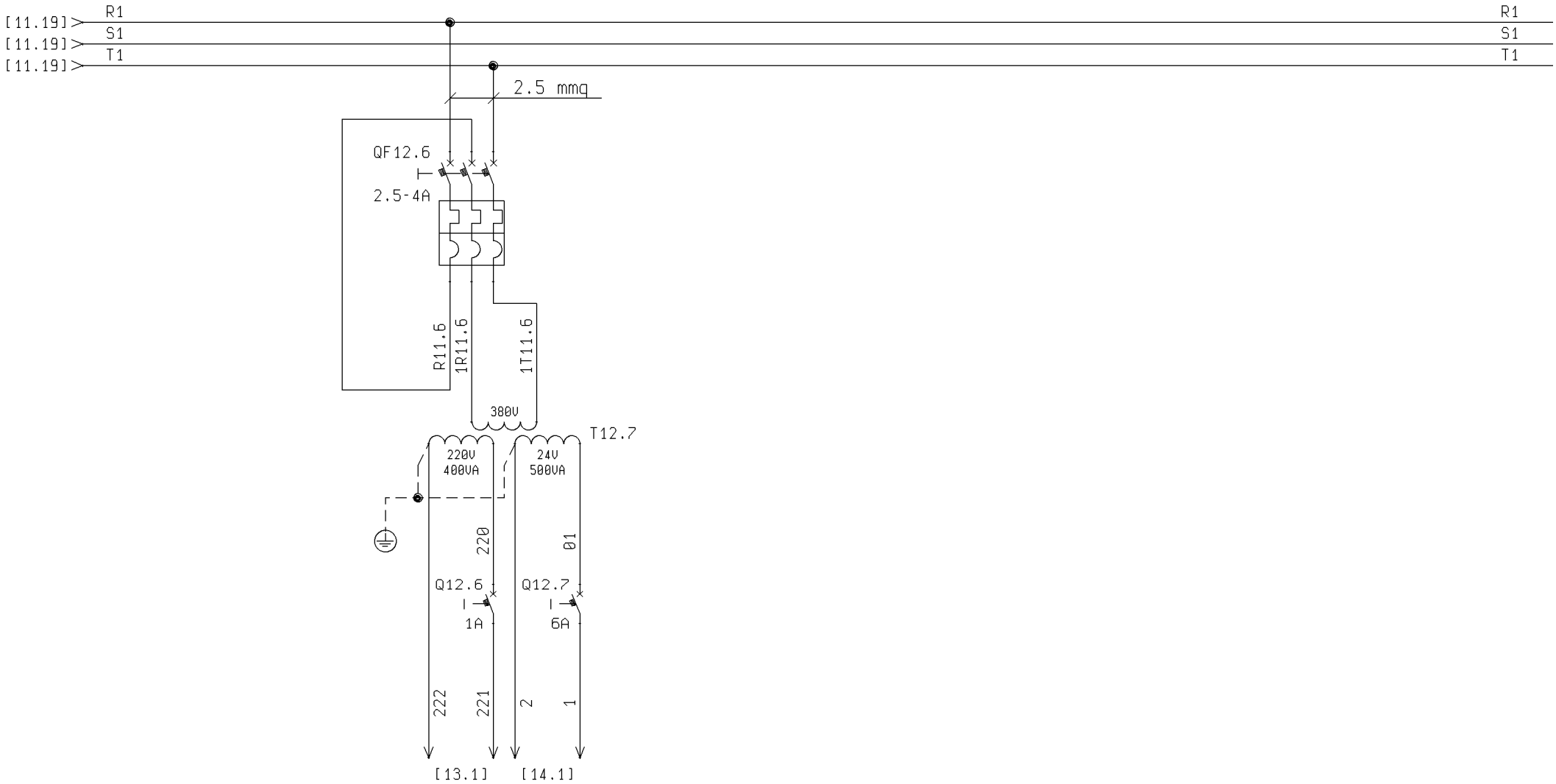
ORDINE : .

DISEGNO N.:13020368 Rev.01 del 09/01/03

DISEGNATO: CEP MD | VISTO: | DATA : 09 GEN 2003 | SCALA : //

FOGLIO 11

SEGUE 12



Tetra Pak
Hoyer S.p.A.

MACCHINA : FRIGUS 400M 400V, 50/60 Hz			FOGLIO 12
CLIENTE : .			
ORDINE : .	DISEGNO N.:13020368 Rev.01 del 09/01/03		SEGUE 13
DISEGNATO: CEP MD	VISTO:	DATA : 09 GEN 2003 SCALA : //	

PROTEZIONE ELETTRONICA

ELECTRONIC PROTECTION

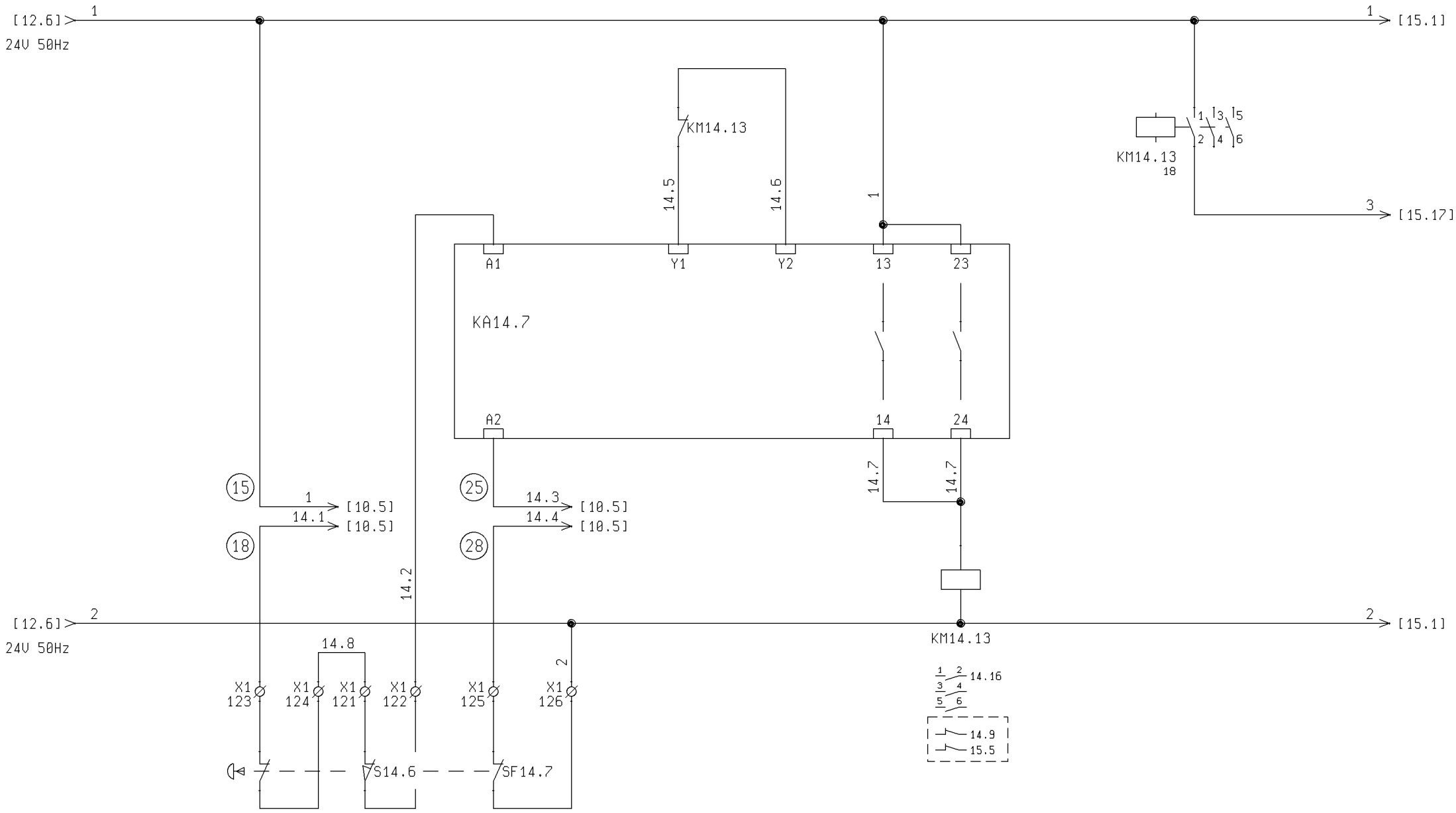
VENTOLA

COOLING FAN

Tetra Pak
Hoyer S.p.A.

MACCHINA : FRIGUS 400M 400V, 50/60 Hz			FOGLIO 13
CLIENTE : .			
ORDINE : .	DISEGNO N.:13020368 Rev.01 del 09/01/03		SEGUE 14
DISEGNATO: CEP MD	VISTO:	DATA : 09 GEN 2003 SCALA : //	

ARRESTO DI EMERGENZA / RIPRISTINO
EMERGENCY STOP / RESET



Tetra Pak
Hoyer S.p.A.

MACCHINA : FRIGUS 400M 400V, 50/60 Hz			FOGLIO 14
CLIENTE : .			
ORDINE : .	DISEGNO N.:13020368 Rev.01 del 09/01/03		SEGUE 15
DISEGNATO: CEP MD	VISTO:	DATA : 09 GEN 2003 SCALA : //	

PRESENZA TENSIONE

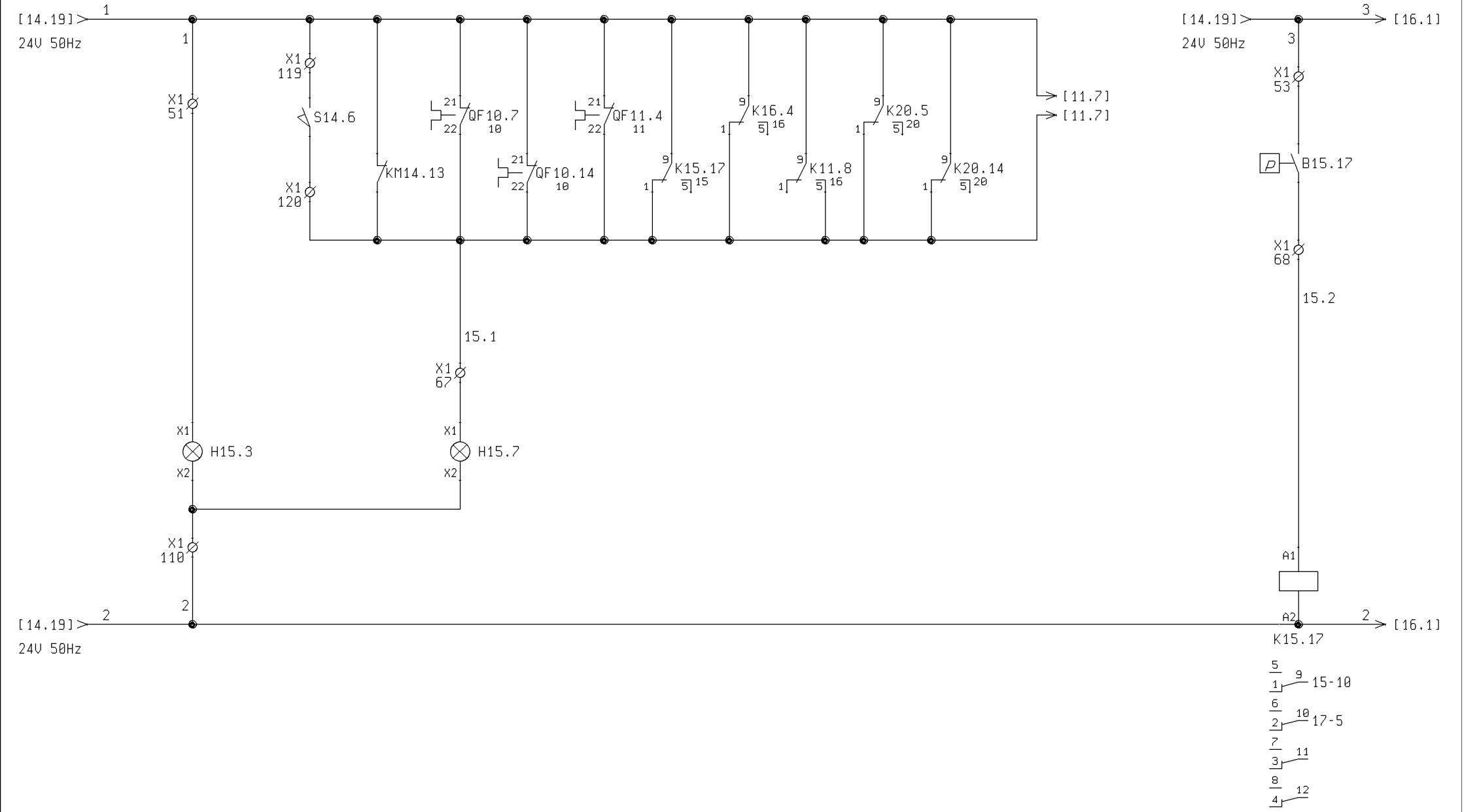
POWER ON

ALLARMI

ALARM

PRESENZA ARIA

AIR ON



Tetra Pak Hoyer S.p.A.	MACCHINA : FRIGUS 400M 400V, 50/60 Hz			FOGLIO 15
	CLIENTE : .			
	ORDINE : .	DISEGNO N.:13020368 Rev.01 del 09/01/03		SEGUE 16
	DISEGNATO: CEP MD	VISTO:	DATA : 09 GEN 2003 SCALA : //	

VELOCITA' POMPA

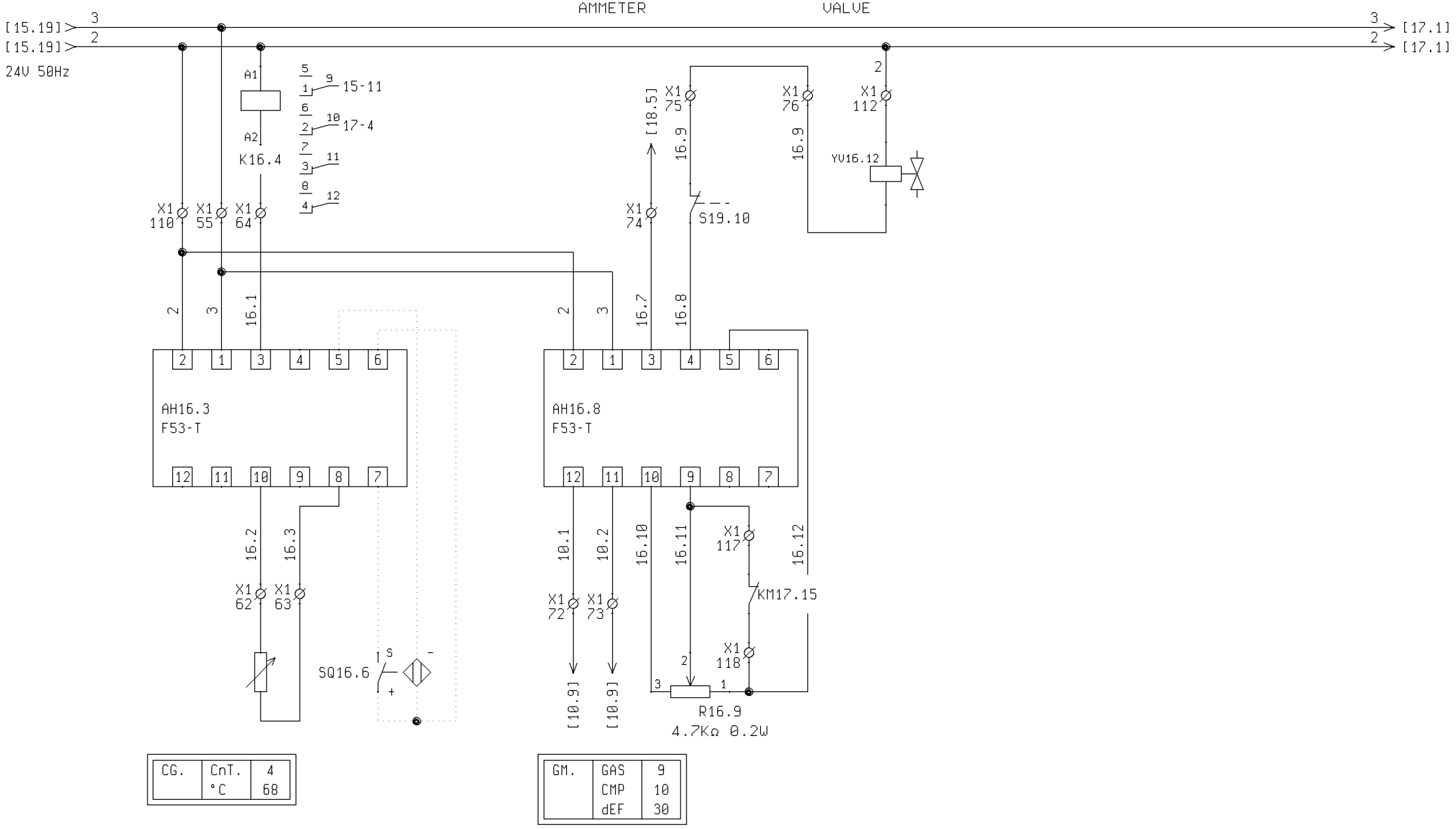
PUMP SPEED

AMPEROMETRO GAS CALDO

HOT GAS AMMETER

VALVOLA GAS CALDO

HOT GAS VALVE

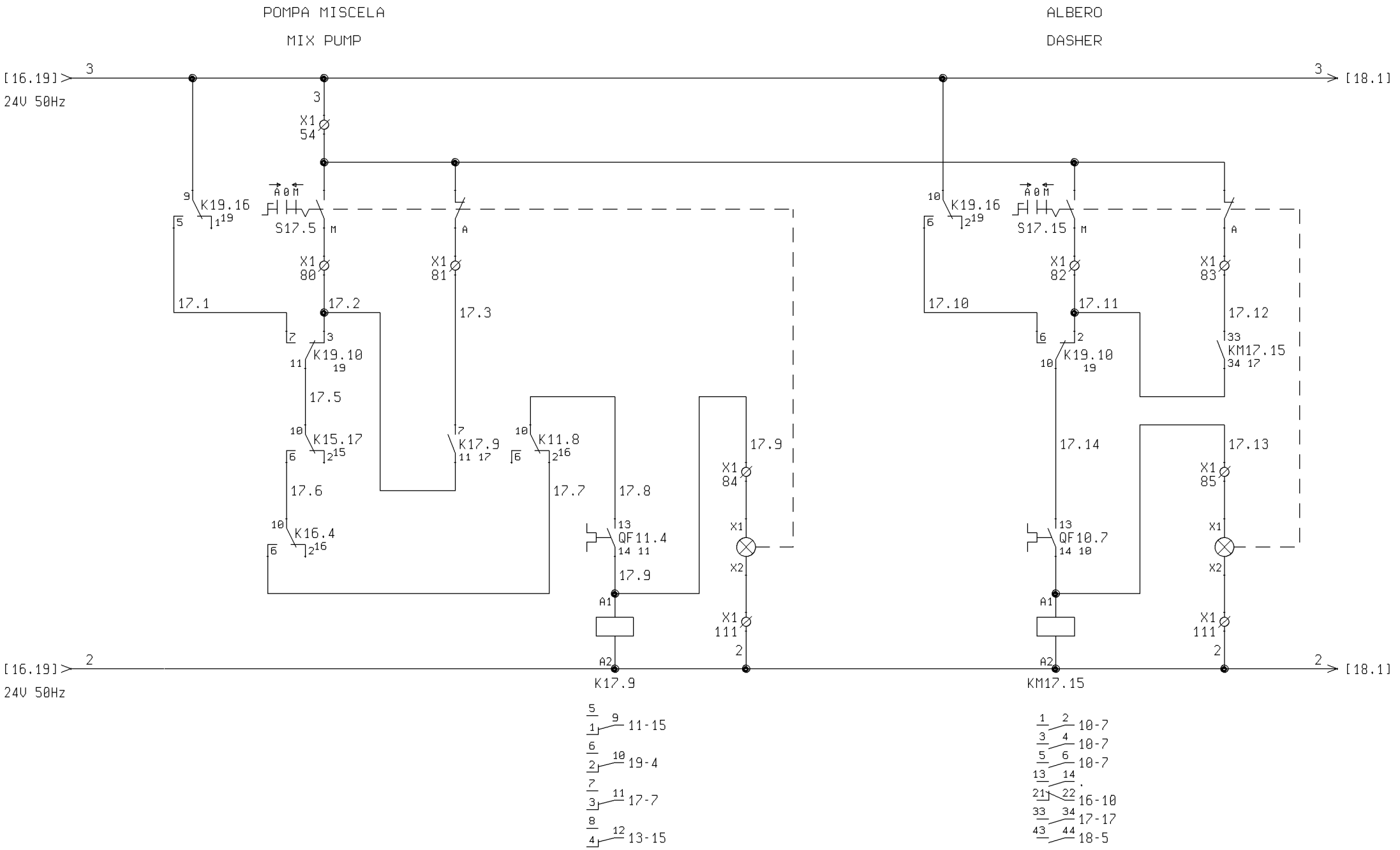


CG.	CnT. °C	4 68

GM.	GAS	9
	CMP	10
	dEF	30

Tetra Pak
Hoyer S.p.A.

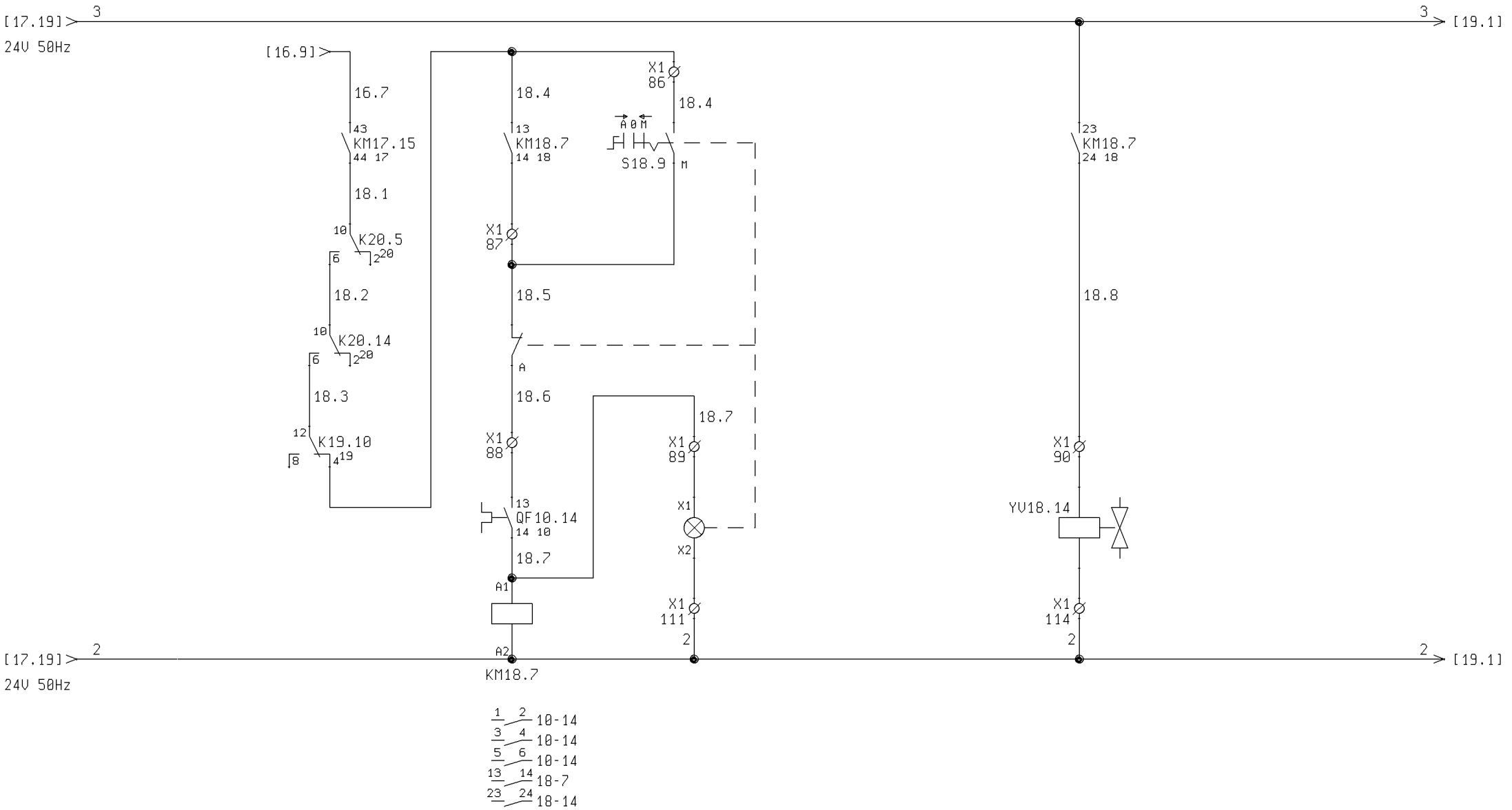
MACCHINA : FRIGUS 400M 400V, 50/60 Hz			FOGLIO 16
CLIENTE : .			
ORDINE : .	DISEGNO N.:13020368 Rev.01 del 09/01/03		SEGUE 17
DISEGNATO: CEP MD	VISTO:	DATA : 09 GEN 2003	SCALA : //



Tetra Pak Hoyer S.p.A.	MACCHINA : FRIGUS 400M 400V, 50/60 Hz		FOGLIO 17
	CLIENTE : .		
	ORDINE : .	DISEGNO N.:13020368 Rev.01 del 09/01/03	SEGUE 18
	DISEGNATO: CEP MD	VISTO: / DATA : 09 GEN 2003 / SCALA : //	

COMPRESSORE
COMPRESSOR

FREON
LIQUID FREON

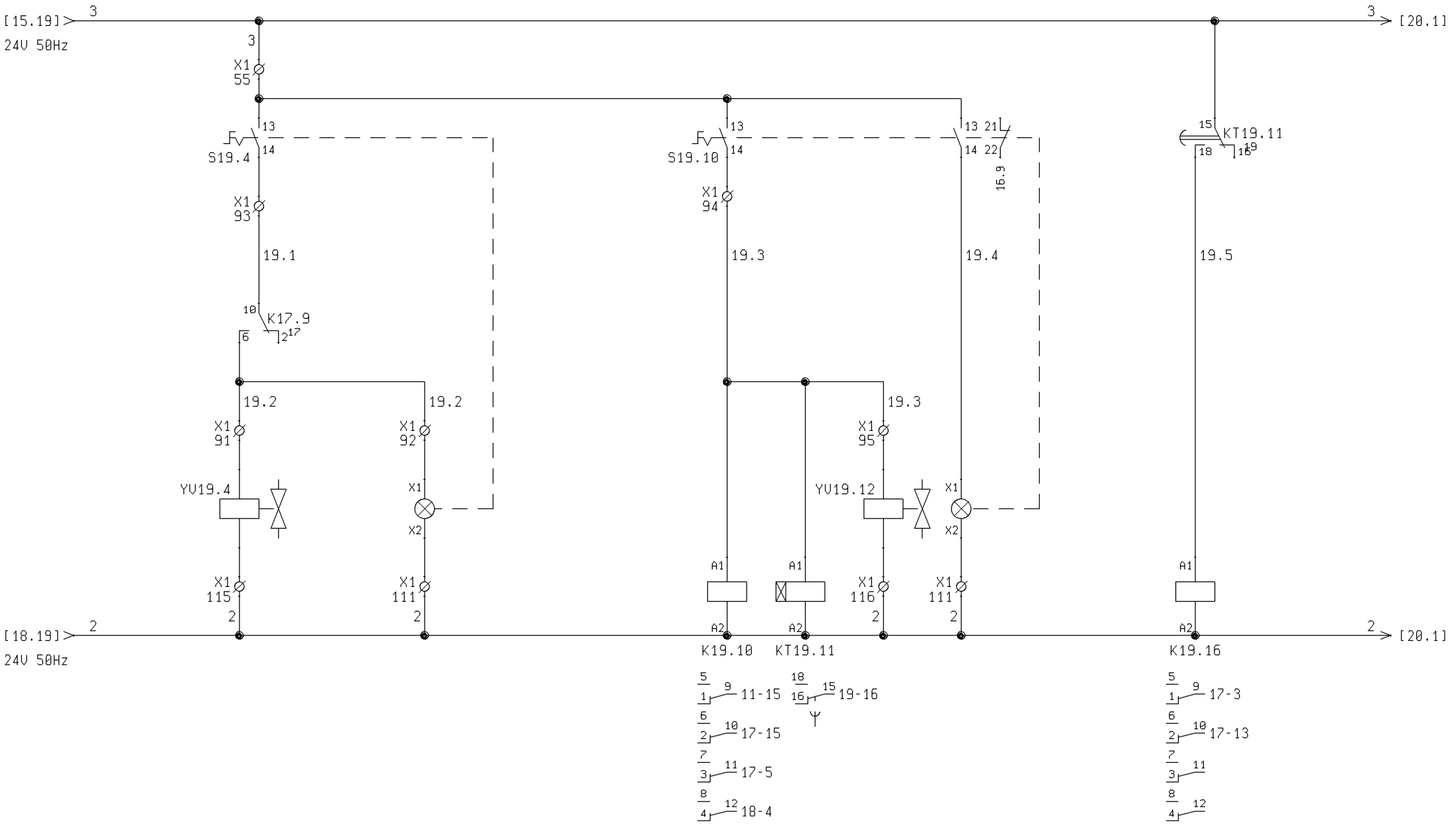


Tetra Pak
Hoyer S.p.A.

MACCHINA : FRIGUS 400M 400V, 50/60 Hz			FOGLIO 18
CLIENTE : .			
ORDINE : .	DISEGNO N.:13020368 Rev.01 del 09/01/03		SEGUE 19
DISEGNATO: CEP MD	VISTO:	DATA : 09 GEN 2003 SCALA : //	

INSERIMENTO ARIA OVERRUN

ARIA PER C.I.P. AIR FOR C.I.P.



Tetra Pak
Hoyer S.p.A.

MACCHINA : FRIGUS 400M 400V, 50/60 Hz			FOGLIO 19
CLIENTE : .			
ORDINE : .	DISEGNO N.:13020368 Rev.01 del 09/01/03		SEGUE 20
DISEGNATO: CEP MD	VISTO:	DATA : 09 GEN 2003 SCALA : //	

PRESSOSTATO
FREON

FREON
PRESSURE SWITCH

PROTEZIONE
ELETTRONICA

ELECTRONIC
PROTECTION

[19.19] 3

3

X1
56

B20.5

X1
96

20.1

A1

A2

K20.5

5
1 9 15-13

6
2 10 18-5

7
3 11

8
4 12

3

X1
58

[13.5]

[13.5]

X1
98

20.3

A1

A2

K20.14

5
1 9 15-14

6
2 10 18-5

7
3 11

8
4 12

3

[19.19] 2

2

24V 50Hz

Tetra Pak
Hoyer S.p.A.

MACCHINA : FRIGUS 400M 400V, 50/60 Hz			FOGLIO 20
CLIENTE : .			
ORDINE : .	DISEGNO N.:13020368 Rev.01 del 09/01/03		SEGUE 25
DISEGNATO: CEP MD	VISTO:	DATA : 09 GEN 2003	SCALA : //

APPARECCHIATURE IN CAMPO

NOTE	DESCRIZIONE	SIGLA UTILIZZATORE	X1 NUMERAZIONE CONDUTTORI	X1 NUMERAZIONE MORSETTI	X1 SEZIONE MORSETTI	X1 COLOREE MORSETTI
	ALBERO DASHER	M1	⏚	.	6	G/V
		M1	U10.7	1	6	GRIGIO
		M1	V10.7	2	6	GRIGIO
		M1	W10.7	3	6	GRIGIO
	COMPRESSORE FRIGORIFERO REFRIGERATING COMPRESSOR	M2	⏚	.	16	G/V
		M2	U10.14	4	16	GRIGIO
		M2	V10.14	5	16	GRIGIO
		M2	W10.14	6	16	GRIGIO
	QUADRO COMANDO CONTROL PANEL	R11.11	11.1	20	2.5	GRIGIO
		R11.11	11.2	21	2.5	GRIGIO
		R11.11	11.3	22	2.5	GRIGIO
		AH13.4	221	26	2.5	GRIGIO
		AH13.4	222	40	2.5	GRIGIO
		.	1	51	2.5	GRIGIO
	PRESSOSTATO ARIA / AIR PRESSURE SWITCH	SF15.5	3	53	2.5	GRIGIO
	QUADRO COMANDO CONTROL PANEL	B15.17	3	54	2.5	GRIGIO
		S17.5-15	3	55	2.5	GRIGIO
	PRESSOSTATO FREON / FREON PRESSURE SW.	S19.4-10	3	56	2.5	GRIGIO
	PROTEZIONE ELETTRONICA	AH13.4	3	58	2.5	GRIGIO
	QUADRO COMANDO CONTROL PANEL	AH16.3	16.2	62	2.5	GRIGIO
		AH16.3	16.3	63	2.5	GRIGIO
		AH16.3	16.1	64	2.5	GRIGIO
		H15.7	15.1	67	2.5	GRIGIO
	PRESSOSTATO ARIA / AIR PRESSURE SWITCH	B15.17	15.2	68	2.5	GRIGIO
	QUADRO COMANDO CONTROL PANEL	AH16.8	10.1	72	2.5	GRIGIO
		AH16.8	10.2	73	2.5	GRIGIO
		AH16.8	16.7	74	2.5	GRIGIO
		S19.10	16.9	75	2.5	GRIGIO
	VALVOLA GAS CALDO / HOT GAS VALVE	YV16.12	16.9	76	2.5	GRIGIO
	QUADRO COMANDO CONTROL PANEL	S17.5	17.2	80	2.5	GRIGIO
		S17.5	17.3	81	2.5	GRIGIO
		S17.15	17.11	82	2.5	GRIGIO
		S17.15	17.12	83	2.5	GRIGIO
		S17.5	17.9	84	2.5	GRIGIO
		S17.15	17.13	85	2.5	GRIGIO
		S18.9	18.4	86	2.5	GRIGIO
		S18.9	18.5	87	2.5	GRIGIO
		S18.9	18.6	88	2.5	GRIGIO
		S18.9	18.7	89	2.5	GRIGIO
	VALVOLA FREON / LIQUID FREON VALVE	YV18.14	18.8	90	2.5	GRIGIO
	INSERIMENTO ARIA / OVERRUN	YV19.4	19.2	91	2.5	GRIGIO
	QUADRO COMANDO CONTROL PANEL	S19.4	19.2	92	2.5	GRIGIO
		S19.4	19.1	93	2.5	GRIGIO
		S19.10	19.3	94	2.5	GRIGIO
	ARIA PER C.I.P. / AIR FOR C.I.P.	YV19.12	19.3	95	2.5	GRIGIO
	PRESSOSTATO ARIA / AIR PRESSURE SWITCH	B20.5	20.1	96	2.5	GRIGIO
	QUADRO COMANDO / CONTROL PANEL	AH13.4	20.3	98	2.5	GRIGIO

Tetra Pak
Hoyer S.p.A.

MACCHINA : FRIGUS 400M 400V, 50/60 Hz

CLIENTE : .

ORDINE : .

DISEGNO N.:13020368 Rev.01 del 09/01/03

DISEGNATO: CEP MD

VISTO:

DATA : 09 GEN 2003

SCALA : //

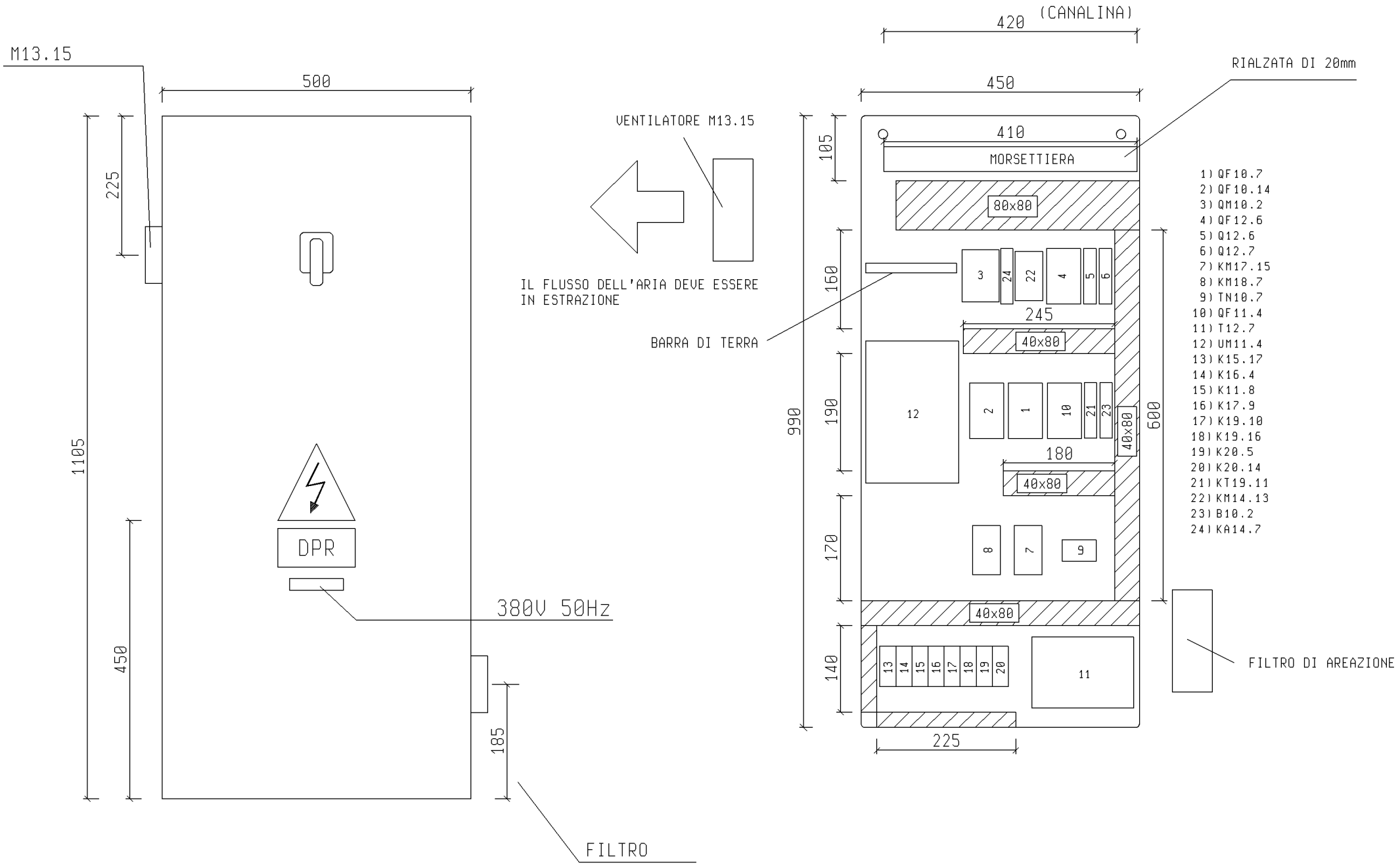
FOGLIO 25

SEGUE 26

1	2	3	3	4	4	4	5	5	5	6	6	6	7	8	9	10	11	12	13	14	15	16	17	18	19
X1	COLOREE MORSETTI	GRIGIO	GRIGIO	GRIGIO	GRIGIO	GRIGIO	GRIGIO	GRIGIO	GRIGIO	GRIGIO	GRIGIO	GRIGIO	GRIGIO	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	SEZIONE MORSETTI	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	NUMERAZIONE MORSETTI	110	111	112	114	115	116	117	118	119	120	121	122	123	124	125	126									
	NUMERAZIONE CONDUTTORI	2	2	2	2	2	2	16.11	16.12	1	15.1	14.8	14.2	14.1	14.8	14.4	2									
APPARECCHIATURE IN CAMPO	SIGLA UTILIZZATORE	LAMPADE	LAMPADE	YV16.12	YV18.14	YV19.4	YV19.12	AH18.8	AH18.8	S14.6	S14.6	S14.6	S14.6	SF14.7	SF14.7	SF14.7	SF14.7									
	D E S C R I Z I O N E	QUADRO COMANDO / CONTROL PANEL		VALVOLA GAS CALDO / HOT GAS VALVE	VALVOLA FREON / LIQUID FREON VALVE	INSERIMENTO ARIA / OVERRUN	ARIA PER C.I.P. / AIR FOR C.I.P.	QUADRO COMANDO CONTROL PANEL		MICRO SICUREZZA ALBERO/DASHER LIMIT SWITCH				ARRESTO DI EMERGENZA/EMERGENCY STOP											
	N O T E																								

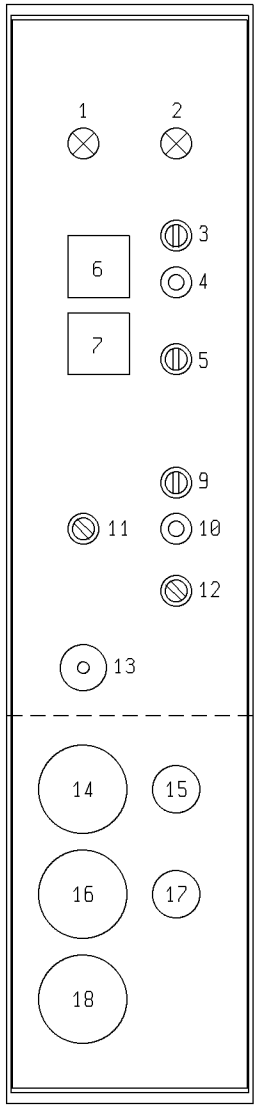
Tetra Pak
Hoyer S.p.A.

MACCHINA : FRIGUS 400M 400V, 50/60 Hz				FOGLIO 26
CLIENTE : .				
ORDINE : .	DISEGNO N.:13020368 Rev.01 del 09/01/03			SEGUE 27
DISEGNATO: CEP MD	VISTO:	DATA : 09 GEN 2003	SCALA : //	



Tetra Pak
Hoyer S.p.A.

MACCHINA : FRIGUS 400M 400V, 50/60 Hz			FOGLIO 27
CLIENTE : .			
ORDINE : .	DISEGNO N.:13020368 Rev.01 del 09/01/03		SEGUE 28
DISEGNATO: CEP MD	VISTO:	DATA : 09 GEN 2003	SCALA : //



POS	ITEM	TYPE/DATA	DESCRIPTION
1	H15.3	WHITE LIGHT	POWER ON
2	H15.7	RED LIGHT	ALARM
3	S17.5	GREEN LIGHT SELECTOR SW. 1-0-2 IMP.	MIX PUMP CONTROL STOP - START
4	R11.11	1KΩ 0.2W POTENTIOMETER	MIX PUMP SPEED REFERENCE
5	S17.15	GREEN LIGHT SELECTOR SW. 1-0-2 IMP.	DASHER CONTROL STOP - START
6	AH16.3	DIGITAL DISPLAY	MIX PUMP SPEED
7	AH16.8	DIGITAL DISPLAY	HOT GAS AMMETER
8	/	/	/
9	S18.9	GREEN LIGHT SELECTOR SW. 1-0-2 IMP.	COMPRESSOR CONTROL STOP - START
10	R16.9	4.7KΩ 0.2W POTENTIOMETER	REFRIGERATING CONTROL
11	S19.4	GREEN LIGHT SELECTOR SW. 0-1	OVERRUN CONTROL*
12	S19.10	GREEN LIGHT SELECTOR SW. 0-1	C.I.P. CONTROL
13	SF15.5	RED MUSHROOM HEAD PUSHBUTTON	SAFETY STOP
14	/	DM63 0/4 bar 1/4" CP INOX	OVERRUN MANOMETER
15	/	MANNESMANN	OVERRUN PRESSURE REG.
16	/	DM63 0/4 bar 1/4" R INOX	OUTLET PRODUCT STOPPER MANOMETER
17	/	MANNESMANN	OUTLET PRODUCT STOPPER PRESSURE REG.
18	/	/	FREON MANOMETER
19	.	.	.
20	.	.	.
21	.	.	.
22	.	.	.
23	.	.	.
24	.	.	.
25	.	.	.